Chapter 25

BACKGROUND

Introduction

The broad term 'Renaissance', which is used in the heading of Part 5 to cover European and Russian architecture from *c.* 1420 (in Italy) to 1830, has been retained although in current terminology the Renaissance style is said to have yielded to the Baroque by *c.* 1630 or even to Mannerism by *c.* 1520. The value of the wider term (which implies a conscious revival of the Graeco-Roman style) is that it makes continuous acknowledgement of antiquity as the stylistic norm and paragon. This allegiance, occasionally ruffled by the Gothic tendencies of certain Baroque architects, was not seriously threatened until the eclecticism of the later eighteenth century brought about a revival of non-European styles and of the Middle Ages; positive opposition to Roman models is rarely found until the time of Pugin. Thus a certain cohesiveness can be claimed for this very long and variegated sequence of buildings dispersed over all the countries of Europe. (Renaissance buildings outside Europe are covered in Part 6.) In Russia the introduction of Renaissance forms overlaps the much-extended Byzantine period (see Part 3, Chapter 16).

At the beginning of the period Roman architecture was the predominant influence, and it was not until the eighteenth century that ancient Greek buildings were seriously studied, producing the neo-Classical belief in the superiority of Greek architecture. By the early nineteenth century the word 'Classical' began to take on one of its modern meanings in that it conveyed the Greek qualities of harmony, proportion, rationality and balance. By an unfortunate extension it has come to be applied to all manifestations of the Graeco-Roman world, however irrational or bizarre. In this Part of the book, therefore, the word 'Classical' is not used to designate a historical period. The more neutral term 'antique' is used to denote Greek, Hellenistic and Roman models. Where the word 'Classical' is used, it implies, however loosely, an adherence to certain architectural values, initially found in the treatise of Vitruvius, and much re-studied later in the forms of Greek architecture. Many Roman buildings were not 'Classical' in this sense, but exercised equal influence on Renaissance architects.

Within the period as a whole, separate stylistic phases can be discerned, although they occur at different times in different regions, and the transitions between them are seldom abrupt.

The terms used here are Early Renaissance, High Renaissance and Mannerism, Baroque and Rococo, and neo-Classical.

The stylistic application of these terms is more fully considered under 'Architectural Character' in each chapter. Only Early Renaissance and neo-Classical can be described as self-conscious movements in reaction to previous styles; the others represent evolutionary developments of style and were branded with the derogatory labels 'Mannerist', 'Baroque' and 'Rococo' by critics of various periods with Classicising tendencies.

The Renaissance of the arts began in Italy as part of a more general revival of Graeco-Roman culture. Early Renaissance architectural styles spread from Florence (*c.* 1420) to other major cities in Italy in the middle of the fifteenth century, and won rapid acceptance throughout the peninsula. Outside Italy, only Russia and Hungary have notable fifteenth-century Renaissance buildings.

By the early sixteenth century, however, Renaissance forms had reached all the countries of Europe. Whereas in Italy this 'High Renaissance' period is marked by greater understanding of the principles and physical remains of ancient architecture, elsewhere the Renaissance more often meant the adoption of Italianate motifs (pp.806, 807, 808) that became ever more bizarre in the process of copying and transmission. Thus, while in Italy in the 1520s architects like Raphael, Giulio Romano and Peruzzi were expanding their range of sources, their vocabulary and above all the less Roman-based inventions of Michelangelo could in the hands of Spanish, French or Flemish masters (p.809) seem very remote from ancient forms. The engravings of the School of Fontainebleau played a particular role in the spread of such 'grotesques' and were reinforced by the pattern-books of Hans Vredeman de Vries and Wendel Dietterlin to create a kind of international 'Mannerist' style in the later sixteenth century.

In the seventeenth and early eighteenth centuries stylistic currents in the different European countries were markedly out of phase, and labels such as the 'Age of the Baroque' are particularly misleading. The characteristics of the Roman and Piedmontese Baroque—illusionism, curvilinear movement, spatial experiment and bizarre detail—were wholeheartedly adopted only in Austria, Bohemia and southern Germany. Protestant England and Holland went through a 'Palladian' revival which produced much plainer, simpler forms, even when Baroque influences were felt at the end of the century. France developed a distinctive national manner based on rational geometries, columnar facades and a crisp handling of stone, together known as French Classicism.

Similarly, early eighteenth-century Rococo, which is essentially a late flowering of Baroque—even more curvilinear in tendency and incorporating asymmetrical surface decoration—had a very different degree of penetration in different countries. In France it was essentially a style of domestic interiors, leaving exteriors and ecclesiastical architecture unaffected. In Austria and southern Germany it was both more pervasive and more extreme, continuing the tendencies of the Baroque in those areas. Meanwhile in England the new anti-Baroque Palladian revival had nipped Rococo in the bud, except as far as interiors and furniture were concerned (p.811). The mid-eighteenth-century neo-Classical movements in France, Italy and Germany were programmatically anti-Rococo.

Neo-Classicism was more than a revival of Greek and other more exotic antique styles. Architecturally it was connected with a return to rational structural principles and their expression in building. In this respect neo-Classicism could favour Gothic solutions over Roman, and it was no accident that architects such as Schinkel and Soufflot admired Gothic architecture—not for its tracery or ornament but for its structural achievement.

The social changes that culminated in the French Revolution and the transitory international suzerainty imposed by Napoleon were the principal factors in the breakaway from the formal disciplines of neo-Classicism. The title 'post-Renaissance' has been given to this period, and it has been included in Part 5 to bring the evolution of European architecture to approximately the end of the nineteenth century before dealing with the architecture of European colonialism, in the later phases of which nineteenth-century eclecticism played an important part, as did the technological developments of the period. The continuing rapid growth of population and the quickening pace of industrialisation and urbanisation were all conducive to the removal of the symbolic authority of antique forms and motifs no matter how removed from Greece and Rome.

In this chapter the emphasis has been placed upon the political, social and cultural history of the Renaissance and post-Renaissance periods in the countries of Europe and Russia. It is important to stress, however, that the division by 'country' is a convenience only (see Plate 5). In the formative centuries of the Renaissance styles, each of the 'countries' of central and southern Europe in particular was divided into many independent or near-independent city-states, dukedoms etc., and political alignments changed frequently. Political and economic status affected the invention and evolution of building types and helped to provided Renaissance architects with the extensive range and number of commissions which ensured the continuity of development which in due course took Renaissance forms to every part of the known world (see Part 6). The great variety of the post-Renaissance period is covered for east and west Europe collectively in Chapter 31; in this background chapter each of the sections on History and Resources and Building Techniques concludes with a section on the post-Renaissance period in Europe as a whole.

Geographical and climatic conditions across Europe helped in this worldwide diffusion of the styles, models for which had already been tried in Europe in similar, if not identical, conditions. And in Europe itself the physical considerations significantly affected the form and appearance of buildings. From the soft reds of low-pitched tiled roofs and pastel-coloured piazzas of Italy and the French Mediterranean seaboard to the angular elegance of the high blue-grey roofs and the more severe lines of northern France, Britain and Scandinavia, the architects of the Renaissance period adapted their models to local materials and climate. The stylistic battles of the nineteenth century and the developing architecture of industry, communications, public health and housing continued this dissemination process throughout the post-Renaissance period and indeed well into the twentieth century.

History

Changes in architectural style and building types are closely bound up with historical shifts during the period. New styles were diffused through connections between powerful patrons, by war and conquest, by the invention of printing, by the movement of architects in search of employment, and, more generally, by the appropriation on the part of rulers and the ruling class of an architectural language to reinforce their political and social positions. The built-in discipline of the Classical language of the orders provided a powerful visual metaphor for social hierarchies, and to this may be attributed much of its success.

Italy

1595

The religious and intellectual unity of Christendom had begun to crumble in the fourteenth century, when Marsiglio of Padua (d. 1342), John Wycliffe (d. 1348) and John Huss (d. 1415) all attacked the temporal power and wealth of the Church. The papacy, held captive at Avignon since 1309 by the French kings, returned to Rome in 1377, only to be disputed for over half a century between two and sometimes three rival popes, each supported by a group of nations. The Conciliar Movement, aimed at reforming the Church and controlling the popes through a series of General Councils, collapsed in 1449, leaving the papacy to recover its independent power. The career of Julius II (1503–13) placed the papacy in control of a relatively strong state stretching across central Italy. On the other hand, its moral authority throughout Europe sank to new depths under the vicious Alexander VI, the warlike Julius II and the aesthete Leo X (d. 1521).

The political history of fifteenth-century Italy is marked by shifting alliances and petty wars between the numerous city-states which made up a wholly disunited country. Attempts by the French to assert dynastic claims in Naples led to the French invasion of 1494; this was followed by the Italian wars, during which the peninsula became the battleground between France and the Habsburg emperors. During their campaigns the northern rulers acquired a taste for Italian art, and the Sack of Rome in 1527 by the emperor Charles V and his Lutheran troops accelerated the dispersal of High Renaissance architects to other centres.

By the 1530s a power structure was established that was to endure until the Napoleonic wars. The Spanish Habsburgs now directly ruled Milan, Naples and Sicily, and Genoa, and exercised much influence over the Medici Grand Duchy of Tuscany and the Dukes of Savoy in Turin. Venice remained an independent republic; though her maritime empire had dwindled, she retained the territories of the terra firma (Padua, Vicenza, Verona, as far west as Bergamo and east to Trieste). Rome had consolidated its grip on the Papal States from Fossanova to Rimini, Bologna and Modena. The great families held almost regal court in their palaces, vying one with the other in cultivated extravagance. The popes, avaricious of their revenues outside the city, spent them prodigally within, and even ran up enormous debts. Before they were brought under effective papal authority in the time of Julius II or later, certain of the more northerly of the States of the Church held their own petty but brilliant courts of the leaders of the families which governed them, such as the Malatesta family of Rimini, the Montefeltri of Urbino or the Este of Ferrara; thus, for a while, architecture in these centres was more responsive to local factors than to developments in Rome. During the seventeenth century the Grand Dukes of Tuscany passed through varying fortunes and the Venetians were intermittently at war with the Turks.

Architecture had a great part to play in the policy of active propaganda that followed the Counter-Reformation. Bourbon claims to the Spanish empire, involving the Spanish possessions in Italy, met with opposition from Austria, England and Holland, and the Treaty of Utrecht (1713) gave Milan and Naples to the Austrians, while the Dukedom of Savoy became a kingdom. In 1718 Venice lost her Adriatic possessions, and by 1737 the House of Medici became extinct and the Duchy passed to Austria.

The Napoleonic invasions (1796–7, 1800), though marking the end of the Venetian republic, meant partial liberation from the Austrian yoke, and an unprecedented unification of the north, from Piedmont to the Adriatic. At the Congress of Vienna (1814–15), the peninsula was re-partitioned into eight states and remained under Austrian domination until the 1848 revolution.

The economic prosperity of late mediaeval Italy depended on early urbanisation, precocious development of banking and the textile industries (especially in Lombardy and Tuscany), maritime trade (Genoa and Venice) and the revenues of the church (Rome). South of Rome economic development was backward: huge agricultural estates supported an absentee aristocracy. However, the central and northern Italian city-states had already begun to lose their economic pre-eminence in Europe as early as the later fifteenth and sixteenth centuries, and there was a gradual return to the land by the urban ruling class. This, together with the dependence on foreign courts, made for an aristocracy based on the merchant classes.

The humanist revival of ancient literature pioneered by Petrarch in the fourteenth century produced a growing interest in the physical remains of antiquity and by 1420 this interest had spread to architecture. Florence pioneered the revival, along with the transformation of the Tuscan dialect into a literary language, but the papal court and Venice, with its access to Greek culture, were equally important centres of new learning. The enlightened despots of the smaller city-states also gave employment to artists and scholars at their courts. The arrival of printing from Germany in the middle of the fifteenth century meant that treatises could be published, and architects were pioneers in conveying information through engraved and woodblock plates.

The challenge of Protestantism in the north, and the Counter-Reformation put in train by the Council of Trent (1545 and reconvened several times in the middle years of the sixteenth century), gradually eroded the supremacy of humanist culture, a change typified by the desire of Sixtus V (1585–90) to turn the Colosseum into a wool factory. This did not, however, mean a reaction against the language of

Classical architecture: Baroque architects continued to draw their inspiration from Roman buildings. Italy continued to be a magnet for artists and writers from north of the Alps; as examples, Goethe's visits and Winckelmann's prolonged residence were crucial for the neo-Classical movement.

The planning of churches was influenced by symbolism, liturgical change, reforming movements and the new religious orders as well as by the aesthetic preferences of architect and patron. 'Decorum' was a fundamental rule of Renaissance culture, and the function of a church was crucial to its plan. Centralised plans based on circle, square and Greek cross were praised for their symbolic perfection but often acknowledged to be unsuitable for cathedral or monastic churches. In practice, commemorative structures associated with miracles, plague deliverance or martyrdom provided opportunities for central plans with domes, exploiting the precedent of the Church of the Holy Sepulchre, Jerusalem, associated with the tomb of Christ. A composite plan, attaching a longitudinal nave to a domed centralised crossing, was an acceptable compromise, where processional functions and traditional Latin-cross symbolism were important. Later, an oval plan provided a directional axis in a basically centralised plan.

Monastic churches in mediaeval Italy had substantial rood screens across the nave, separating the laity from the monks' choir and presbytery. This practice died out in new churches of the fifteenth century, and the choir was removed to a chapel behind the high altar. After the Council of Trent screens were systematically taken out to accord with the emphasis on preaching and participation in the mass. The new religious orders of the second half of the sixteenth century, the Jesuits, Barnabites and Oratorians, tended to adopt single-nave plans, often with interconnecting side chapels, abbreviated transepts and clear division of the parts.

The large urban dwellings ('palazzi') of the urban patriciate exhibit considerable regional variation in their plans, although by the 1530s they tended to a common language of decoration. Shared features are the rectangular block of three storeys, the central colonnaded courtyard, and the placing of the main apartments on the first floor (the 'piano nobile'), facing on to the street; the vaulted ground floor may house shops, summer apartments and, by the sixteenth century, stables, while children's and servants' rooms are on the second floor, wine, oil and fuel storage in the basement. Apartments consisted of suites of interconnecting rooms of diminishing size, from the great 'salone' to the small 'camera'. Corridors were rare and the functions of rooms flexible, depending on their size rather than their furnishings. The number of rooms was relatively small in mercantile palaces of the fifteenth century; only high ecclesiastics and petty princes retained large households. By the seventeenth century the number of domestic staff greatly increased and the use of carriages necessitated large service areas and stables with wide entrances. Symmetrical planning was common from the early fifteenth century but the Baroque period saw an increasing emphasis on multiple axes, spectacular staircases and interconnecting courtyards.

In Florence ground-floor shops, common in the fourteenth century, tended to disappear from palace facades, which nonetheless retained an embattled air with rusticated stonework. A continuous stone bench for public use around the base of a palace was a characteristic Florentine feature. In the sixteenth century the use of rustication was often restricted to quoins and voussoirs, and large pedimented windows supported on volutes ('kneeling windows') appeared on the ground floor. In 1581 Montaigne was shocked to find oiled linen or paper used in the windows instead of glass, but glass was rare until the seventeenth century.

In Rome cardinals' palaces were larger, initially more loosely planned, and had loggias at upper levels for maximum shade and air. Corner towers and cross-mullioned ('Guelph') windows were common until the end of the sixteenth century, when the Cancelleria introduced planning and decoration reminiscent of the Ducal Palace at Urbino. The Palazzo Farnese was the sixteenth-century model of a large palace, with its colonnaded vestibule, monumental courtyard, and axial relationship with the garden. A smaller-scale palace was evolved for members of the enlarged papal bureaucracy: grandeur of facade, staircase and courtyard was given precedence over size. These palaces seemed inconveniently small in the seventeenth century.

The distinctive planning of Venetian palaces was related to their waterside setting and conservative mercantile occupants. Openings concentrated at the centre of tripartite facades corresponded to long transverse entrance halls for unloading merchandise and to 'through' salons above. Sites were longer and narrower, and courtyards smaller, than in central Italy, and palaces were sometimes divided vertically between different members of the family. In the mainland towns of the Veneto such as Vicenza and Verona, something of the same tripartite planning is found, and courtyards are often replaced by gardens. Palladio introduced self-consciously Vitruvian elements, such as tetrastyle atria, into Vicentine palace design. 78 A

The villa as a distinctive architectural type re-emerges in the Renaissance after its disappearance in late antiquity. Villas vary so enormously according to function (agricultural centre, hunting lodge, suburban retreat), region, patron and architect that only a few common features, such as external loggias, can be discerned. Land reclamation, agricultural improvement and consolidation of estates preceded villa construction in Tuscany and the Veneto. Palladio drew on the traditions of the Veneto to evolve a

1998

In the fifteenth century the new Italian architectural language was spread above all by patronage connections. For example, the Italianising tendencies of the court of Matthias Corvinus, King of Hungary, reinforced by his marriage with Beatrice d'Aragona of Naples, brought the early appearance of Renaissance forms in Budapest. Particular dynastic connections continued to be as important as larger historical forces in the diffusion of architectural ideas.

1996

The Italian wars (1494–1530) reinforced a taste for Italian architecture in the French kings and the Habsburg emperors, and, as in ancient Greece, the Italian states gained cultural hegemony by losing their independence. Only in the second half of the seventeenth century did the France of Louis XIV displace Italy as the major source of architectural models, which were seen to be more appropriate to an age of absolutist monarchy than were those of the petty Italian courts. The seventeenth- and eighteenth-century European wars had more localised architectural implications (see the sections dealing with the history of individual countries below), but in this period it was Napoleon's European campaigns that left the most enduring imprint on the political and cultural institutions of Europe.

The revival of Classical learning that began with Dante (1265–1321) and Petrarch (1314–74) led naturally to an interest in the visual remains of antiquity, and it was fostered by the fifteenth-century Italian humanists and archaeologists. The text of Vitruvius's treatise on architecture, known but only partially understood in the Middle Ages, was compared with Roman buildings by Alberti (q.v.) and edited by scholar archaeologists. The fifteenth-century inventions of woodcut and copperplate engraving and of printing with movable type were important for the transmission of architectural theory and visual models all over Europe; the printed editions of Alberti (1485) and Vitruvius (1486), and especially the illustrated works of Serlio (1537–), Vignola (1562) and Palladio (1570), made it possible to build in the new style without visiting Italy. Architectural publications are surveyed for each country below.

The religious transformations in western Christendom that resulted from the Reformation movement led by Martin Luther (1483–1546) had important implications for church architecture, resulting in plain forms and uncluttered interiors without subsidiary altars. The internal movement of Catholic reform known as the Counter-Reformation was spearheaded by the new religious orders, especially the Jesuits, whose proselytising missions took Roman sixteenth-century church forms all over Europe. There is no single Counter-Reformation church plan, but aisleless single-nave churches with side chapels and the choir placed behind the altar were particularly favoured for monastic and collegiate churches. Centralised plans based on the circle or the Greek cross, which had been popular for votive and commemorative churches from the 1470s, continued to be so used in the Catholic world throughout the period. They also proved suitable for Protestant churches, which did not require a single focus on the main altar.

The Italian urban palace and country villa (p.813 A,B) were adapted to the different political, social and economic conditions of the rest of Europe. It took more than a century, however, for monarchical and aristocratic patrons to abandon the outward signs of power such as towers and crenellations, and to adopt the more subtle language of dominance implied by the Classical orders. It was left to France and Austria to devise an architectural setting for the exercise of absolute power, as at Versailles and Schönbrunn. Secular public buildings such as town halls, guild halls, hospitals and buildings for charitable foundations were characteristic of independent city-states. Seventeenth- and eighteenth-century royal initiatives were often connected with military training or rewards for military service, like the Invalides in Paris, and the Greenwich and Chelsea hospitals in England. Eighteenth-century movements for social reform in Europe brought a renewed emphasis on public buildings, and the late eighteenth and early nineteenth centuries are notable for the construction of hospitals, prisons and institutions of public education, such as museums, or of entertainment, such as theatres and opera houses.

1996

The use of gunpowder artillery and the metal cannon ball rendered obsolete the late mediaeval defences, which had been based on high walls and towers. In late fifteenth-century Italy new defensive systems were pioneered which involved low walls punctuated by arrow-shaped bastions, to provide both offensive capability and defensive coverage of the curtain wall by flanking fire. Italian military engineers and treatises on defensive systems spread these ideas all over Europe in the sixteenth century, and they influenced the design of city defences until the eighteenth century.

1998

Linked with military needs were Renaissance ideas of city planning based on radial street systems and centralised plans. They were most commonly put into practice in founding new fortress citadels, such as the Venetian town of Palmanova (1593), or new capitals such as Karlsruhe (1715). Within existing cities, streets were widened, straightened or newly planned on geometrical principles to focus on important monuments, fountains or obelisks. The successive interventions of Renaissance and Baroque popes in expanding and rationalising Rome itself provided a model for many Baroque princes all over Europe. The need for military control and the increase in the use of carriages and coaches made wider streets desirable. City planning provided the opportunities for uniform architectural developments such as terraced housing and with them the beginnings of speculative building.

1998

were obliged to show great ingenuity in fitting the necessary rooms into confined and irregular spaces. The most striking example in the seventeenth century was Antoine Le Pautre's Hôtel de Beauvais, Rue François Miron, Paris (1656). Although the construction of both châteaux and hôtels slowed down after the court moved to Versailles, these trends in domestic planning were continued in Parisian private houses of the eighteenth century after the Regent returned to Paris in 1715.

In church building, the Reformation made little impact. Although officially tolerated between the Edict of Nantes in 1598 and its revocation by Louis XIV in 1685, apart from Salomon de Brosse's Temple at Charenton, the Huguenots commissioned few important buildings. The new Counter-Reformation had an important impact on Roman Catholic church buildings, especially in the first half of the seventeenth century. As elsewhere in Europe, the later sixteenth-century Roman church types with aisleless nave and two- or three-storey facades were initially predominant, but in the later seventeenth and eighteenth centuries there was a return to the basilican plan, with a preference for a nave colonnade which continued around the apse as a semicircular screen. The Napoleonic era saw a brief preference for the antique temple form, as in the Madeleine, Paris (begun 1806).

The unparalleled centralisation of royal power produced in Versailles a building which, if it remained unique in France, set a pattern which was imitated throughout Europe. The long sequence of magnificently decorated state reception rooms set a new standard for state expenditure on such projects, and the inordinate length of the facade created a new kind of architectural scale or—more precisely—demonstrated the impact to be achieved by abandoning notions of scale altogether. And when the court tired of such grandiose living and moved to the Trianons, they too set a fashion for intimate comfort which was widely followed in continental Europe. Versailles is also the supreme example of the garden as an adjunct to the house—laid out on its axes, continuing its lines across large areas of the surrounding country. The garden, as devised by Le Nôtre, is an integral part of the architectural conception.

From the royal plans for Paris in the mid-sixteenth century to Ledoux's revolutionary designs two hundred years later, the organisation of urban space was a constant preoccupation of French architects. Henry IV's great schemes, the Place Dauphine and the Place des Vosges, which were imitated in Covent Garden and elsewhere, began a tradition of grand public squares which reaches to Dijon, Bordeaux, Nancy and many other towns.

The second half of the eighteenth century saw the emergence of new types of public building: for instance markets, which often provided opportunities for novel structural techniques; and theatres, U-shaped auditoria with portico-fronts, which begin to appear in many provincial towns from the 1770s onwards. Napoleon initiated a major programme of public buildings, such as the Paris Bourse, General Post Office, and Ministry of Foreign Affairs, and this continued under the Restoration and Second Empire.

Spain and Portugal

In the fifteenth century the Iberian peninsula was divided into several small states with different languages and creeds. In the south the last Islamic foothold on western European soil was the Kingdom of Granada. It was surrounded by the Christian kingdoms of Portugal, Castile and Aragon: the small kingdom of Navarre bordered on France. Unification took place in the latter part of the fifteenth century with the marriage between Isabel I of Castile (d. 1504) and Fernando V of Aragon (d. 1516). Together they then led a crusade against Granada, which fell in 1492, and annexed Navarre in 1512 to give Spain and Portugal their present borders.

Turkish domination of the eastern Mediterranean trade routes encouraged in Spain and Portugal the spirit of more broadly based maritime enterprise, which is powerfully reflected in the architectural symbolism of the buildings of the Convent of Christ at Tomar (see Chapter 12). Spain's search for alternative routes led to the discovery of the Cape of Good Hope (1487) by Diaz and of the Americas by Columbus (1492). Portugal too extended its influence; Vasco da Gama took trade to the East Indies (1497) while Brazil became its largest overseas colony. Territorial expansion heralded the dissemination of Spanish and Portuguese architectural styles in the New World.

In 1520 the Habsburg king Charles I of Aragon and Castile was crowned Charles V of the Holy Roman Empire. This event thrust Spain for the first time to the forefront of European politics and brought her dominion over the Netherlands, Sardinia, Sicily, Naples, Milan and Germany. To this European empire, greater than any since Charlemagne, Charles added by conquest Mexico, Peru, Chile and Central America before he abdicated in 1556.

Philip II (1556–98), during whose reign the Escorial (p.816B), one of Europe's greatest palaces, was built, inherited the problems of this vast empire. The first was rivalry with France, a burgeoning power in European politics. The second was discontent in the Netherlands, which was fuelled by England and led ultimately to the ill-conceived and catastrophic Armada. This contributed to the gradual depletion of the Spanish purse, and was offset only by Philip's successful claim in 1580 to the Portuguese throne, which remained in Spanish hands until 1640. The monarchy's desire for the purity of the Catholic faith resulted in a policy of religious intolerance. Its instrument, the Spanish Inquisition, had been established by 1487, and by 1502 Muslims and Jews on Spanish soil had been either converted or expelled. Even the converted Muslims, the Moriscos, were deported in 1609. The result was the loss of many fine architectural craftsmen.

Spain's involvement in the Thirty Years War was a drain on resources and her hold over Italy was weakened. Trade and industry continued to languish and by 1700 Spain had become a protégé of Louis XIV, who upon the death of the last Habsburg king placed his own grandson on the Spanish throne as Philip V. This event led to the War of the Spanish Succession (1701–13) and the loss of Naples, Sardinia and Milan to Austria. The relative peace and prosperity of the late eighteenth century, a period during which architecture and the arts were fostered, was shattered by Napoleon's invasion at the beginning of the nineteenth century. With powerful help from the British armies under Wellington, the French were finally driven out of Spain in 1813. From the period of the Peninsular War the American colonies revolted, contributing to the further decline of Spain and Portugal, and eventually won their independence.

Austria, Germany and Central Europe

The area considered here is present-day Germany, Austria, Switzerland and Czechoslovakia, with parts of Poland and Hungary. In the period 1450–1830 it was divided into many independent and dependent states and cities with shifting political allegiances.

Renaissance culture had its first real flowering outside Italy at the enlightened humanist court of Matthias Corvinus of Hungary (1458–90). Close contacts with Italy had been a feature of Hungarian culture since the fourteenth century, and Matthias's reforming reign, which raised Hungary to the status of the greatest power in central Europe, saw an influx of Italian artists. Thereafter, power shifted to the Jagellonian Kings of Bohemia who, for a brief period, controlled an empire which included Hungary and Poland, and Renaissance influences spread to Prague and Cracow. Hungary's Renaissance was brought to a close by the Turkish invasions (1526) and the subsequent division of the country: the Jagellonian period in Poland ended in 1572.

The dominions of Spain, Burgundy and the Netherlands were added to those of the old Holy Roman Empire under Charles V (Charles I of Spain) in 1520. The first religious wars following the Reformation were brought to an end by the Peace of Augsburg, under which each ruler was allowed to determine the religion of his territory. Broadly, southern Germany, Austria (after Protestant beginnings) and the Rhineland remained Catholic, while northern Germany adopted Lutheranism. The Habsburg territories were divided between Spain on the one hand and the old empire, centred on Austria and Bohemia, on the other. Political and religious fragmentation meant that the importation of Renaissance forms was sporadic and localised in the sixteenth century, but a lead was given by the free cities of Nuremberg and Augsburg, and by the proselytising Jesuits in Austria and southern Germany. The struggle with the Turks was a constant preoccupation.

The Thirty Years War (1610–48) between Catholic and Protestant princes brought a halt to building, and recovery was slow, even after the Peace of Westphalia. The influence of the Austrian empire in Germany declined in the second half of the seventeenth century, and the principalities built up their sovereignty. Prussia began to gain power in the north; Frederick I became King of Prussia in 1701.

Austro-Prussian rivalry came to a head in the eighteenth century with the War of the Spanish Succession (1740–48) and the Seven Years War (1756–63). Frederick II (the Great) (1740–86) raised Prussia to a position of pre-eminence among the German states; he embellished his capital of Berlin with palaces and public buildings. In Austria Joseph I's reign (1705–11), marked by creative architectural patronage, was followed by the reforming period of Maria Theresa (1722–80), while her son Joseph II (1780–90) attempted to impose the ideas of the Enlightenment.

Napoleon's campaigns brought the Holy Roman Empire to an end, eliminating dozens of free cities and ecclesiastical territories. As elsewhere in Europe, Napoleon both aroused liberal expectations and united his new subjects in feelings of nationalistic opposition. At the Congress of Vienna (1815) the map of central Europe was redrawn. The three hundred or so margravates, palatinates, electorates, duchies, ecclesiastical states and imperial cities of Renaissance Germany, under the suzerainty of the reigning houses of Habsburg, Hohenzollern, Wittelsbach and Wettin, were reduced to thirty-nine states subject only to Austria.

The Protestant liturgy introduced by the Lutheran reformation, with its rejection of imagery and the cult of the saints, favoured extreme simplicity in church design. Such few Protestant churches as were built had plain hall-like interiors and galleries to accommodate larger congregations; sometimes communion table and pulpit were aligned on the central axis. The Jesuits, who began to combat Protestantism in the second half of the sixteenth century, favoured churches deliberately modelled on Roman examples (for example, Michaelskirche, Munich, 1583). The Baroque and Rococo in Germany and Austria were the popular styles for hundreds of Catholic churches and rural monasteries built by wealthy abbeys and powerful bishops between 1680 and 1780. Often erected on particularly functional and flexible series of villas for agricultural proprietors. They incorporated barns, storage loggias and granaries into hierarchically unified groups of buildings, dominated by the pedimented fronts. In Rome the suburban villa modelled on literary descriptions of ancient villas was popular with members of the pleasure-loving papal court. Vistas giving long perspectives, staircase ramps, niched exedrae and grottoes, influenced by Bramante's Cortile del Belvedere (1503–13) and Raphael's Villa Madama (begun 1516), became features of garden planning in the sixteenth century; water played an increasing part, feeding fountains, cooling dining tables, and powering elaborate automata.

France

After the end of the Hundred Years War and the expulsion of the English in 1453, France was less a feudal kingdom and more a modern monarchy with a powerful tendency toward centralisation and absolute rule. The Valois kings came to power in 1515 and ruled until Henry III was assassinated in 1589, having previously recognised Henry of Navarre, and thus ushered in the Bourbon dynasty which was to remain in power until the revolution two centuries later. During these periods the kingdom was enlarged to include Brittany, and extended eastwards to the Rhine; the frontier with Flanders was also pushed back.

The advance of centralised royal power under François I (1515–47) and Henri II (1547–59) was seriously shaken by the wars of religion of the 1570s and 1580s. Henri IV of Navarre (1589–1610) entered Paris in 1593 and embarked on a campaign of national recovery and political centralisation which was later continued by Louis XIII (1610–43) and Louis XIV. When the latter took over the reins of government when Mazarin died in 1661, France was already the most populous, the richest and probably the best organised country in Europe. Louis XIV ruled with absolute power for over half a century. His military might ensured French hegemony, and was only checked by a coalition of European powers in the ruinous war of the Spanish succession (1704–13). Louis's brilliant minister Colbert, who worked ceaselessly to improve France's commerce and industry, had little influence on policy, and the Bourbon successors, Louis XV (1715–74) and Louis XVI (1774–93), soon found that the costly wars in Europe, North America and India, and the general inflationary trends of the eighteenth century, made it essential to raise additional revenues. By 1789 the country was near to bankruptcy, and growing discontent led to a meeting of the Estates General and to the revolution, which was to simplify and rationalise the processes of government, decentralising control to eighty-three departments—its financial problems to be solved by the nationalisation and sale of church property. Napoleon emerged as the new ruler of France (Emperor 1804–14) and for fifteen years dominated the continent by force of arms until his defeat at Waterloo.

Many fine Roman buildings had survived in Provence, but it was not until the French invasions of Italy in 1494 and 1508 that French architects were constrained by Italian example to pay heed to the lessons of antiquity. Charles VIII returned from Italy to the Château d'Amboise on the Loire (p.816A), the first royal residence in France, built originally almost entirely in the fifteenth century. He brought Italian artists and craftsmen home with him and initiated the early period of château-building on the Loire, most examples dating from the first quarter of the sixteenth century. It was in these châteaux that a Franco-Italian style flourished. They were in hunting country accessible to the King, and the importance of hunting as a means of attracting royal visits (and the resultant preferments) ensured that the château remained a prime building type until the court was finally centralised in Versailles in the 1660s.

From the end of the sixteenth century a growing proportion of royal and state business was conducted in Paris, and the King came increasingly to rely on his appointed civil servants to run his affairs rather than on the hereditary aristocracy. As a result, between 1600 and 1660, Paris saw the construction of a large number of rich private residences—'hôtels'—which became a characteristic building type exercising influence on domestic planning throughout the whole of Europe. In both châteaux and hôtels the adoption of a certain kind of Italian manners made fashionable by the Marquise de Rambouillet (1588–1665) led to a considerable refinement of plan. Moving away from the unitary feudal household, where much of life was conducted in the great hall, French fashion sought to create a number of small rooms for private social activities. These were usually grouped in threes or fours: an 'antichambre'; a 'chambre', in which formal receiving normally took place, with the host reclining on the bed; a more intimate 'cabinet', where special friends would be received and where objects of particular value were often displayed; and, if space permitted, a 'garderobe'.

With the refinement of social life went a desire to conceal the coarser elements of the household. Stables were, if possible, banished to a separate service court; servants' quarters communicated with the principal apartments by hidden passages and stairs. At the Château de Maisons, near Paris (1542–6), a tunnel was constructed so that food, wood and other necessities might be brought in unseen.

As patrons' demands became more complex, so the number of sites available for development in Paris became fewer and more restricted. Architects the latter half of the eighteenth century laid the foundations of more rapid changes in the nineteenth century. Britain, as the 'workshop of the world', dominated these changes, and as early as 1826 the German architect K. F. Schinkel on a visit to Britain had marvelled at the number of warehouses and factories, some as large as the Royal Palace in Berlin, and the thousands of factory chimneys belching smoke. By the early 1840s Britain was annually producing 40 million tons of coal and 1.3 million tons of iron, and was exporting 734 million yards of cotton per annum. By the middle of the nineteenth century, Belgium, France and Germany were developing apace, and over the following years pockets of industry were established in parts of Poland, Austria, Scandinavia, Spain and Italy.

During the second half of the nineteenth century output grew significantly, and as continental Europe began to flourish industrially Britain turned to its empire to provide outlets for its manufactured goods and for capital investment. In this way Britain maintained its leading position, and by the early 1900s was exporting over 5000 million yards of cotton and producing 200 million tons of coal each year. Steel, whose manufacture first became cheaper in 1856 with the process invented by Henry Bessemer (1813–98), gradually superseded cast iron as the desirable material for most machinery, railways and steamships because it was less brittle. Britain's lead in iron and steel production was maintained until the 1890s, by which time it was overtaken not only by the USA but also by Germany.

The industrial changes of the nineteenth century were reflected in the growth of communications. The rivers of Europe, the traditional arteries of trade, remained of vital importance, and carried increasing quantities of goods as, from the 1830s, steamboats facilitated the transport of large cargoes upstream as well as downstream. As the Industrial Revolution gathered pace the rivers were supplemented by canals, and during the later eighteenth century in Britain a network of canals was constructed, linking the midlands with the industrial north and with London. During the nineteenth century the chief river systems of mainland Europe began to be connected, for instance the Rhine-Marne canal of 1838–53.

The spread of canals was constrained, however, by the rise of railways, in which Britain again took the lead, building almost 11,000 km (6635 miles) by 1850. Initially, the railways linked neighbouring cities such as Manchester and Liverpool (1830) or Brussels and Antwerp (1836), but national and international routes were created quite quickly, and during the second half of the century the Alps were conquered, connecting Italy with Austria (through the Brenner Pass, 1864–7), France (the Mont Cenis Tunnel, 1857–71) and Germany (the S. Gotthard Tunnel, 1872–82). The provision of railway stations, from small buildings on branchlines to metropolitan termini, was one of the most pervasive signs of the nineteenth-century revolution in communications.

An increased birth rate and reduction in infant mortality contributed to a steady rise in population during the nineteenth century. The figures for Europe as a whole increased from about 180 million in 1800 to 274 million in 1850 and 400 million in 1900. In the most industrially advanced countries the growth was proportionately greater: in England and Wales the population rose from over 9 million in 1801 to about 18 million in 1851 and 33 million in 1901; and between 1851 and 1901 Germany's population grew from 34 million to 56 million. In Britain the increase was preponderantly urban: by 1851 only half the population could be defined as rural, and by 1901 only a quarter. Elsewhere the balance changed more slowly, and Germany was the only other major country to become predominatly urban by 1900. Nonetheless, the growth of cities was a striking phenomenon in most parts of Europe. The two major centres of population were London and Paris, which grew respectively from less than one million to about five million, and from half a million to about three million during the nineteenth century. But many other cities expanded prodigiously; among those whose population increased tenfold between 1800 and 1900 were Berlin, Warsaw and Glasgow.

The cities of Europe were not ideally equipped to cope with the hugely augmented numbers. Outside the city gates of Berlin, for instance, people lived in makeshift huts or barns, and in almost every city there were districts with densely-built tenements (or more usually in England, terraced houses) which were grossly overcrowded. They were speculatively built, generally close to places of work, and with poor ventilation, light and sanitation. Outbreaks of cholera in the 1830s and 1840s focused attention on the need for reform, and it became common for public authorities to establish systems for the inspection of housing and to insist on basic standards of hygiene. In Britain, for instance, the Public Health Act of 1848 made local government responsible for sewerage, refuse collection and water supplies. There were also improvements to ancient street systems, sometimes ensuring a degree of social control, as in the case of Haussmann's (1809–91) Paris or the Ringstrasse in Vienna. The development of urban transport was fostered and was to culminate around 1900 in the appearance of motor buses, electric trams and underground electric railways. At the same time there were more radical approaches to town planning, most notably the garden city ideal promoted by Ebenezer Howard (1850–1928) in 1898 and the industrial city scheme exhibited in 1904 by Tony Garnier (1869–1948).

If the growth of the urban working classes was one of the most notable features of nineteenth-century life, hardly less important was the rise of the urban bourgeoisie, sustained as much by the needs of trade, banking, the law and government (both local and national) as by industry itself. Shops, offices and public buildings were the conspicuous signs of prosperity, growing more elaborate as the century progressed, and there was concomitant development of affluent residential districts. Between the wealthiest of the middle classes and the traditional aristocracy there was a blurring of distinctions. The relative decline of agricultural wealth gradually weakened the old power base—although some of the aristocratic landowners profited by the presence of coal or other resources on their estates—but for many of the newly rich the building or acquisition of a country seat remained the symbol of success.

In religious matters the nineteenth century was generally marked by tolerance. In western Europe particularly there was a gradual removal of civil disabilities from religious minorities, affecting not only Christian groups such as the Huguenots in France or the Catholic and Protestant Nonconformists in Britain, but also the Jews. This toleration was accompanied by a slackening in the institutional power of the established churches, and the success of the Gothic Revival in church-building may be partly understood as a search for an ecclesiastical architectural language, distinct from the predominantly Classical forms of other public buildings. Distinctions between religious groups also became important, and the common adoption of a Romanesque style for synagogues or the revival of mediaeval liturgical forms in the Catholic churches designed by A. W. N. Pugin (1812–52) reflect a desire for denominational definition amidst the religious pluralism of the nineteenth century.

In the first half of the century there was a proliferation of proselytising sects, especially among the new urban communities in Britain and other parts of western Europe, but after about 1850 there were fewer such initiatives. David Strauss's controversial *Life of Christ* (1835–6) and Charles Darwin's *Origin of Species* (1859) challenged many religious assumptions, and Protestants increasingly fell into two groups—the fundamentalists who accepted the Bible as literal truth in spite of modern scholarship, and others who attempted to adapt Christian beliefs to the views of contemporary science. In the Catholic church authority became more and more centred on Rome, and at the Vatican Council of 1870 the dogma of papal infallibility was proclaimed, the same year marking the end of the temporal power of the papacy with the final unification of Italy. The building of large cathedrals, like that at Westminster of 1895–1903, can thus be seen as an affirmation of religious identity in the face of growing secularism.

If the progress of religion during the nineteenth century was somewhat halting, the quest for knowledge knew no bounds. The great national libraries, such as that in Paris (1859–67), were like banks in which all human knowledge was stored, their huge reading rooms the halls for borrowers and depositors. Museums—of both science and the arts—were another characteristic feature of the nineteenth century, more extensive and more accessible than the generally private collections of previous centuries. The broadening of scientific and technical knowledge was reflected in the widespread creation of new education institutions, starting with the French Ecole Polytechnique (1794) which inspired similar polytechnic schools in Prague, Vienna, Stockholm, Zurich and many German cities. As the industrial and commercial basis of European life became more sophisticated it became increasingly desirable to extend education provision to all classes. Universal primary education was to be found in most countries of western and central Europe by the 1800s, and there were various supplementary facilities including public libraries and adult education centres.

The nineteenth century displayed an appetite not only for 'useful knowledge' but also for the arts, and almost every significant European city had its cultural powerhouses. These great concert halls, opera houses, theatres and art galleries catered for an increasingly large middle-class audience and were sometimes built with a splendour that might in previous times have been reserved for cathedrals and palaces.

Resources and Building Techniques

1990

The period saw a transformation in the training, role and social position of the architect, and this is discussed below in relation to each country. Again Italy, where the designer-architect was already the norm in the fifteenth century, and where the architectural treatise was pioneered by Alberti, provided the initial model. The foundation of academies from the second half of the sixteenth century onwards further enhanced the intellectual standing of architects, but the later French architectural academy (founded 1671) for many years remained unusual in providing a systematic education in design. The economic position of architects improved with increasing specialisation, and many made fortunes in the seventeenth and eighteenth centuries from speculative contracting. Despite growing professionalism during this period, however, the dilettante gentleman architect continued to be influential.

Renaissance architecture is not notable for structural innovation. Probably the most spectacular structural achievements of the period were the great domes—Florence Cathedral, S. Peter's in Rome and S. Paul's in London. All are double-shell constructions. Brunelleschi's famous achievement of building the Florentine dome (S. Maria del Fiore) (p.512) without centering was based on techniques closer to Islamic domes (brickwork with spiralling courses) than to ancient Roman models. The dome of S. Peter's (p.871) applies the same techniques to hemispherical shells, while Wren's dome of S. Paul's (p.1031) is a complex mixture of stone inner dome, brick intermediate cone and timber roof, and was influenced by French examples such as Les Invalides in Paris (p.949).

Italian Renaissance architects experimented with the revival of the masonry techniques of ancient Rome, but Roman concrete construction was little emulated. Stucco was reintroduced using Roman recipes, and was widely taken up all over Europe both for decorative interiors and to simulate stonework externally.

The processes of building and the economic structure of the building industry remained comparatively unaltered over the period. However, the increasing refinement and systematisation of architectural drawing (described more fully below) resulted in a greater degree of separation of the architect from the building site.

Italy

South of the Alps, the Po valley creates a vast northern plain stretching from Turin to Padua, embracing many of the cities of Lombardy and the Veneto: here Milan is the centre of an area of brick building, where Renaissance forms are expressed in brick and stucco or clothed with moulded terracotta. Venice, sited in its lagoon, imported wood from the mainland forests, red marble from nearby Verona, and stone from Istria, part of its empire. Easily worked Istrian stone hardens on exposure to the air and lends itself well to fine sculptural detail (p.845).

1998

Florence had abundant if coarse arenaceous limestone (pietra forte) in quarries to the south of the city, while the grey sandstone (pietra serena) of Fiesole and Settignano could be used in monolithic columns as well as carved in the fine detail required by the new architecture. White marble was quarried at Carrara and Seravezza, where the Medici opened new quarries and searched out also the coloured marbles so highly prized in the later sixteenth century. Siena, to the south of Florence, built much in brick, but, like other Tuscan hill towns, had access to tufa and travertine.

Rome had retreated from its seven hills in the Middle Ages to the low-lying areas beside the Tiber. Reinhabiting the hills—the policy of successive popes—required the rehabilitation and use of the ancient aqueducts. The characteristic materials of Roman Renaissance architecture are fine brick and travertine from the quarries around Tivoli, but volcanic peperino and tufa were also used, the latter providing a light vaulting material. White and coloured marbles were still pillaged from the ancient ruins.

Southern Italy and Sicily were less developed than the northern and central parts of the peninsula. Naples was, however, an important centre. Neapolitan stone is all volcanic, from the yellow tufa used for walling, to the grey-black peperino employed for cut stone detail. Sicily, which enjoyed an architectural flowering in the Baroque period, is well endowed with calcareous tufas and soft limestones.

The varied climate of the Italian regions had its effects on building types. The cooler and wetter towns of the north often have arcaded streets. The drainage of the Po valley meant an increasing demand for villas in the Veneto. Restricted sites and lack of gardens and courtyards in Venice produced taller palaces with belvederes, balconies and clustered windows. In the hotter, drier climate of Rome, palaces had large courtyards with loggias, and water played a fundamental role in villa design. All over Italy windows were smaller than in northern Europe, and open arcades were provided to give shade. With little rain roofs could be gently pitched, lending themselves to cornices and balustrades.

In the fifteenth and sixteenth centuries Italian architects came from a wide variety of design-allied backgrounds: painting, sculpture and goldsmithing as well as carpentry and stoneworking. Antonio da Sangallo the Younger (1484–1546), Michele Sanmicheli (1484–1559) and Andrea Palladio (1508–80) were among the few architects of the High Renaissance to be brought up in the building trades. Knowledgeable patrons with access to the treatises could have as decisive an influence on the design as an architect in the fifteenth century. Architects shared in the improvement in the status of artists as the traditional trade guilds declined in importance, and joined painters and sculptors in the 'three arts of design' upon which the Florentine artists' academy was founded in 1563. The Academy of S. Luke was also founded in Rome, but there was as yet no formal system of training. Architectural dynasties and workshops such as that at S. Peter's, Rome, provided continuity of design and building knowledge.

In Baroque Rome routes into architecture now included literature, law and the church as well as the traditional path of the Lombard mason; carpentry was seen as a source of inventive detail and variety, and the new craft of stucco-working also produced practising architects. The study of geometry was particularly important for the complex spatial inventions of the Baroque. In the eighteenth century there was a move towards the standardisation of architectural training, such as that established in France in 1671. An architectural scholarship was established at the Roman Academy of S. Luke in 1702, and a chair of civil architecture was founded in Padua.

In the fifteenth century no architect could survive merely by supplying designs. Continued activity in another art, an official post in a board of works or a court, or a supervisory role on a building site was

1998

1998

essential to an architect's livelihood. Florence, with few salaried positions and no court until 1530, became a net exporter of architects to other centres. In city republics and at royal or ducal courts architects were expected to turn their hands to civil engineering and to the design and construction of fortifications.

Financial rewards improved in the sixteenth and seventeenth centuries and architects' pretensions are mirrored in their portraits and private houses. Competition for their services from foreign princes enhanced their market value at home, as witnessed by the career of Bernini. At the papal court leading architects could now expect knighthoods and valuable *ex gratia* gifts in addition to their regular salaries. The design of fortifications became an increasingly specialised activity, entrusted to military engineers.

The techniques of architectural drawing were greatly advanced during the Renaissance. Brunelleschi's invention of linear perspective enabled architects to make convincing renderings of their own designs and of the antique buildings they studied; Francesco di Giorgio and Leonardo brought refinement to bird's-eye views and perspectival sections. Drawing in perspective was, however, little help in the building process, as Alberti had already observed in his *De Re Aedificatoria* (1452), in which he stressed the need for plans, elevations and sections. Raphael reiterated the demand in his *Letter to Leo X* of *c.* 1519, and it is in his workshop at S. Peter's that we first find evidence of a three-fold system of orthogonal drawings to the same scale. The standardisation of drawing practice freed the architect from the site, though many preferred to maintain day-to-day supervision.

Peruzzi continued to explore the possibilities of perspective, producing remarkable sections and perspectival axonometrics. Michelangelo's use of heavily worked-over drawings in chalk with multiple corrections were contemporary with Palladio's exquisite precision in pen and ink. The Michelangelesque tradition was continued by Buontalenti, Bernini and Borromini in the new medium of graphite. Borromini's drawings show evidence of complex constructional geometry.

The use of wooden models is attested by documents from the Middle Ages onwards. In the Renaissance they served to explain the architect's ideas to patrons unfamiliar with drawing, and to provide a more enduring record than the drawings, which were frequently consumed in models. The model by Sangallo the Younger for S. Peter's was strongly criticised by Michelangelo. While models of entire projects frequently lacked details, full-scale wooden maquettes of capitals were often made; Michelangelo tested out his design for the Palazzo Farnese cornice in a full-scale wooden model, and also used clay models for complex forms such as the Laurentian Library staircase. Metal templates for profiles were standard practice.

The organisation of the building trades remained relatively static over the period, and was not marked by great technological advances, although there was some tendency towards large-scale contracting. In the fifteenth century task-rate salaries and day-labour were the norm, and contracting 'in great' for an entire building was rare. Separate contracts were issued for each artisan, and accounts kept by the purveyor or patron. In Venice, where guild boundaries remained rigid, contracting for more than one trade was forbidden by law. On a large site stonecutters, wallers, plasterers and carpenters all had separate foremen ('capomaestri'): to be the capomaestro of the stonemasons, who supplied cut-stone detail, was often tantamount to being the architect, whereas the waller's job, frequently the best paid, involved little design skill, and such men rarely became architects.

The dictatorial ducal regimes of the sixteenth century saw the further dissolution of guild boundaries, greater centralised supervision and even the use of commandeered labour for ducal buildings. In papal Rome, too, architects more frequently acted as contractors, and there was some speculative building when the city was expanded.

France

The large windows, high-pitched roofs and tall chimneys, developed in France in response to climate, posed problems for the assimilation of an Italian architectural vocabulary. The proportion of window to wall remained greater in France than in Italy, and until *c.* 1650 the plan elements of a building were always roofed as discrete units, usually with slates. Chimneys were incorporated into a Classical design only with difficulty and frequently attracted eccentric decoration.

France is rich in building stone and slate which could be transported by river. Stone was the traditional material for monumental or grand urban buildings, though brick remained popular, even with aristocratic patrons, until the 1630s. The use of wood and plaster was widespread in vernacular architecture, but few buildings constructed in these materials have survived.

France's prolonged prosperity led to the construction of major buildings throughout the country, from Rennes to Besançon and Bordeaux to Aix-en-Provence, in the seventeenth and eighteenth centuries. If perhaps less influential than those in the Paris region, they are often no less distinguished.

Although Giuliano da Sangallo, Fra Giocondo, Leonardo da Vinci, Primaticcio, Vignola, Serlio and Bernini all visited France, it was a long time before the French architect was able to enjoy the status of his Italian counterpart. At the beginning of the sixteenth

Between the late eighteenth century and World War I the development of building materials and technologies progressed at an unprecedented pace. The possibilities of iron construction were most dramatically illustrated in 1779 by the Iron Bridge at Coalbrookdale, Shropshire, created by the iron-founder Abraham Darby III (1750–91) and probably based on a design by the architect Thomas Farnolls Pritchard (1723–77). Cast iron was soon adopted on a growing scale for structural purposes and in the 1790s William Strutt (1756–1830) erected several cotton mills at Belper, Derbyshire, partly supported internally by cast-iron columns. The first known building with a consistent internal cast-iron column and beam system (previously mill floors had been supported on heavy timber beams) is the Benyon, Bage and Marshall flax mill at Shrewsbury (1796–7). The advantages of such a system were considerable, since the structure required little floor area, allowed greater flexibility in design through the bay system, permitted a larger number of storeys than was practicable with masonry alone, and could be made more fire-resistant by constructing the floors on shallow brick arches ('jack arches') spanning between the floor beams. Mills of this type, constructed eight or nine storeys high, and with outer walls of conventional brick or masonry, were not uncommon in the English textile towns by the 1830s. An example of great modernity, the Phillips, Wood and Lee mill at Salford, Lancashire, built in 1799–1801, was powered by a Boulton and Watt steam engine and heated by steam transmitted through the hollow cast-iron columns. Gas lighting was added in 1805.

Through the early years of the nineteenth century iron became quite widely used for columns, roof supports and staircases, and occasionally for entire buildings such as the conservatory at Carlton House, London (1811–12). The combination of glass and iron, successfully employed in Fontaine's Galerie d'Orléans in Paris (1829–31), was an attractive one where plenty of natural light was required, and became the usual choice for some of the most notable new types of building: shopping arcades, conservatories, markets, exhibition halls and railway stations. The use of large panels of sheet glass—thinner and cheaper than plate glass—which was pioneered in the conservatory at Chatsworth, Derbyshire (1836–40), was an important advance, and the availability of relatively cheap wrought iron after about 1820 was significant because its tensile properties were ideal for ties, bolts and trusses, where cast iron was too brittle. The new materials were sometimes deftly combined with the more monumental effects of conventional masonry, as at the Library of S. Geneviève, Paris (1839–50), or the University Museum, Oxford (1854–60), but the new structural possibilities were unequivocally displayed in buildings such as the Crystal Palace, London (1850–1), or the Halles Centrales, Paris (1853). Iron and glass structures could be erected speedily from components carried to a site by modern transport systems, and they embodied advanced technology in a way that was appropriate for railway stations or the many international exhibitions which followed that held in the Crystal Palace in 1851. Prefabricated iron buildings were also manufactured for export to all parts of the world.

The 1880s mark the next phase in the development of structural iron. For the 1889 international exhibition in Paris, Gustave Eiffel (1832–1923) created the famous 300 m (985 ft) high tower which bears his name and was the tallest structure in the world, while the Galerie des Machines spanned an unprecedented 114 m (375 ft) with almost miraculous ease. By this time rolled steel beams were being produced in quantity and superseded wrought iron in the construction of wide-span buildings, leading ultimately to fully steel-framed structures, masonry-clad as a fire precaution, as at Kodak House, London (1910–11). In the meantime, the more fluent characteristics of iron and glass were being expressively exploited in Art Nouveau works, for instance the Maison du Peuple, Brussels (1896–8) or the Paris Métro stations (1900).

The advent of reinforced concrete in the years around 1900 introduced a material capable of withstanding great compressive and tensile loads, as steel could do, but with the further important advantage of a high degree of fire resistance. Concrete—that is, a mixture of cement and rubble or gravel with water—had become a reliable material with the introduction and development of durable 'Portland' cement during the nineteenth century, and was quite widely used for foundations and floors, where its strength under compression was most required. Before concrete could be safely employed for more complex structures, however, some form of reinforcement was necessary to counteract its weakness under tension, and many methods were tried. François Coignet (1814–88) patented a system of iron tension rods in 1856, and in 1877 Joseph Monier (1823–1906) took out a patent for cement and iron beams, which was developed by the German firm of Wayss who published the important theoretical work *Das System Monier* in 1887. Crucial work was undertaken by a Belgian, François Hennebique (1842–1921), who substituted steel for iron and devised hooked connections for the reinforcing bars (1892). One of the most prominent early demonstrations of Hennebique's system was in staircases at the Petit Palais, Paris (1897–1900).

The profound advances which occurred in building materials and technologies during the nineteenth century was summed up in the Post Office Savings Bank, Vienna, of 1904–6. Here steel stanchions, a suspended glass ceiling, reinforced concrete, glass floor slabs, central heating and aluminium details contribute to an air of confident modernity. Yet even in the materials of more ordinary buildings the nineteenth century saw many changes. Hand-made bricks were gradually superseded by more regular wire-cut or machine-pressed bricks, often efficiently burnt in continuous kilns such as that designed by Friedrich Hoffmann in 1858. The availability of cheap sheet-glass from mid-century meant that large-paned windows could be afforded for buildings of relatively modest size. Where decoration was desired an enormous range of panels, lintels and sculpture was available, mass-produced in brick or terracotta. Cast-iron balconies, railings and roof finials were also common. As transport systems improved and the same kinds of materials—whether natural or manufactured—became available in most parts of Europe, vernacular traditions were increasingly threatened.

Although structural advances produced the most dramatic changes in building technology, the provision of services was also of great consequence for nineteenth-century architecture. Gas lighting was sufficiently refined to be introduced into houses by the 1840s, and continued to be improved until, by the turn of the century, it began to be superseded by electricity. In 1880 electric lights were installed at Cragside, Northumberland, by the English pioneer Joseph Swan, and by 1900 mains electricity was provided in most major cities. Great improvements in urban life also occurred through advances in drainage and sanitation. The introduction of the water-closet (especially the washout closet of about 1870), effective main drainage, and the provision of pure water were not only civilising factors in domestic design, but prerequisites for the development of large commercial buildings. The problems of heating and ventilation in large buildings were the object of much experimentation, often involving hot-water radiators or hot-air ducts. An alternative was the 'Plenum' system, filling a building with warm (or cool) air under slight pressure, as employed at Glasgow School of Art (1897–1909). The advent of the telephone by the 1880s was a further factor in the development of major commercial buildings.

Architectural Publications

Italy

1998

The writing of treatises was pioneered in Renaissance Italy, first through manuscripts and then through printed books. Leon Battista Alberti's *De Re Aedificatoria* (written 1452, printed 1485/6), the first architectural book since antiquity, gave, though unillustrated, a rich theoretical basis to Renaissance architecture. Antonio Filarete's utopian *Libro* (1465) and Francesco di Giorgio's two *Trattati* (1470s, 1490s) circulated in manuscript. The latter were particularly influential for their fortification designs and marginal illustrations.

The text of Vitruvius was seriously studied in this period, the first printed edition appearing in 1486. Illustrated scholarly editions (Fra Giocondo, 1511) followed, and Italian translations with commentaries (Cesarino, 1523), the best being Daniele Barbaro's version with Palladio's illustrations (1556).

Illustrated handbooks of the 'rules' of the Classical orders were pioneered by Sebastiano Serlio (Book IV, 1537) and Giacomo Barozzi da Vignola (1562). Andrea Palladio was the first to publish both systematic rules, antiquities, and examples of his own buildings in his hugely influential *Quattro Libri* (1570). Vincenzo Scamozzi's encyclopaedic *Idea* (1615) was particularly successful in Holland and England, especially through his Book VI on the orders. In the Baroque period Francesco Borromini's *Opus architectonicum* (1725) is a posthumous publication of his designs for the Oratory, while Guarino Guarini (*Architettura civile*, 1737) and Bernardo Vittone (1760–6) combined their own work with general instruction. Carlo Lodoli's functionalist ideas, so important for neo-Classicism, were transmitted in Francesco Algarotti's *Saggio* (1756) and Andrea Memmo's *Elementi* (1786). Francesco Milizia's *Principi* espoused a more empirical neo-Classicism, while his architectural biographies follow in the important tradition of Giorgio Vasari (1550, 1568) and Francesco Baldiniucci.

Sketchbooks of antiquities, advocated by Alberti, were fundamental for the diffusion of the Renaissance style. The first published repertories are by Serlio (Book IV, 1540) and Antonio Labacco (Libro, 1552 etc.). G. B. Montano's fantastic reconstructions of ancient buildings (1624 etc.) were influential on the Roman Baroque, while Giovanni Battista Piranesi's engravings and polemical treatises (1761, 1765, etc.) were even more formative for neo-Classical conceptions of antiquity.

France

France has perhaps the richest and certainly the most strongly theoretical tradition of architectural writing, to which it is impossible to do justice in a brief survey.

Vitruvius was edited by the architect Guillaume Philandrier (Philander; 1544, 1550) and translated in 1547 by Jean Martin, who also prepared editions of Alberti and Serlio. After his move to France, Serlio published his Books I, II and III in Paris (1545, 1547) and his *Libro Straordinario* in Lyons (1551). His Book VI on domestic architecture remained unpublished until recently, but influenced J.-A. du Cerceau the Elder's three *Livres d'Architecture* (1559–72). His *Plus excellents bâtiments* of 1576–9 gives a precious record of the great sixteenth century châteaux, and begins a long tradition of publishing French buildings.

1580

French theoretical treatise-writing begins with Jean Bullant's *Reigle générale d'architecture* of 1568, based on his antiquarian studies in Rome. Philibert de l'Orme's *Premier tome de l'Architecture* (1567) is of great importance for its discussion of stereotomy, as well as its enthusiastic nationalism, evident in the introduction of a 'French' order. His mastery of practical geometry also comes out in his *Nouvelles Inventions de bien bastir* (1561). The grotesque strain in later sixteenth-century French architecture is exemplified by Hugues Sambin's *Oeuvre de la diversité des Termes* (1572). Relatively modest designs for town houses are presented in Le Muet's *Manière de bien bastir* of 1623.

French obsession with the orders reached its apogee in the seventeenth century. While Fréart de Chambray's *Parallèle de l'architecture antique et de la moderne* (1650), insisted on the supremacy of the original three antique orders, belief in absolute canons of proportion for the orders was challenged by Claude Perrault, who asserted a customary rather than a rational basis for architectural beauty. Perrault's translation of Vitruvius (1673) became the standard edition, while his *Ordonnance des cinq espèces de colonnes* (1683) was equally influential.

The teaching at the Royal Academy of Architecture produced a new kind of publication, the *Cours d'architecture*, but the initial emphasis, as in François Blondel's *Cours* (1675, 1683), was still firmly on the orders. Daviler's *Cours* (1691) was more heterogeneous, and included discussions of Vignola and Michelangelo and a dictionary of terms. The more practical everyday side of architecture was dealt with in such books as L. Sarot's *Architecture françoise* (1642) and P. Bullet's *L'Architecture pratique* (1691), while the tradition of self-publication in the du Cerceau mould was continued by Antoine Le Pautre's *Desseins de plusieurs palais* (1652–53). Jean Marot's collections known as *Le Grand Marot* (*c.* 1665) and *Le Petit Marot* (*c.* 1655–60) made designs of contemporary buildings widely available.

The rationalist tendencies that were to lead both to neo-Classicism and to the Gothic Revival are early stated in the Abbé de Cordemoy's *Nouveau Traité* of 1706, espousing an architecture of right-angles based on structural honesty. The Abbé Laugier restated these ideas in the *Essai sur l'architecture* of 1755, with its celebrated statement of the architectural primacy of the primitive hut. The most widely read general handbook of the eighteenth century was Jacques François Blondel's *Cours d'architecture* (1771–7), a broad-minded and comprehensive work. Germain Boffrand's *Livre d'architecture* (1754) is a series of essays with many plates of his own work, espousing an aesthetic of *bon goût*. Like Blondel, Boffrand believed every building type should have an appropriate 'caractère', derived not so much from the orders as from its overall composition. These ideas were developed by Le Camus de Mezières (*Le Génie de l'architecture*, 1780). 'Caractère' assumes a heavily symbolical aspect in Claude Nicolas Ledoux's *L'architecture* (1804), where the buildings of the utopian community of Chaux are described.

The commodious planning of interiors, in which the French excelled, was expounded in numerous handbooks on domestic building, such as J. F. Blondel's *La distribution de maisons de plaisance* (1737) and C. E. Briseux's *L'art de bâtir des maisons de campagne* (1743).

Etienne-Louis Boullée's *Essai sur l'art*, with its ideal geometrical projects, remained unpublished until this century. His pupil Jean-Nicolas-Louis Durand produced the most influential architectural book of the neo-Classical movement: his *Précis des leçons d'architecture* (1802–5). Here buildings are dealt with in terms of structural elements ('vertical combinations') and functional types, and the huge array of exemplars, especially of public buildings, furnished models for the next generation of architects all over Europe.

The Low Countries

The first translation of Serlio's Book IV was published in 1539 in Antwerp, a major centre for sixteenth-century architectural books. Pieter Coeck's prints of triumphal arches (1549), Cornelis Floris's collections of ornament (1556, 1557) and, especially, the works of Hans Vredeman de Vries were widely disseminated in Europe, as well as influencing architecture at home. Vredeman's *Architectura* (1577–81) popularised the strap-work and grotesque characteristic of the northern Renaissance; his *Variae Architecturae Formae* is a collection of fantastic cityscapes. Rubens's *Palazzi di Genova* (1622), a collection of engraved drawings of Genoese palaces, was intended to inspire emulation among urban patrons.

The true nature of 'Dutch Palladianism' is revealed by the absence of seventeenth-century Dutch translations of Palladio, whereas twenty-two editions of Scamozzi's treatise appeared between 1640 and 1715. These included abbreviated handbooks of the Orders such as those of Simon Bosboom. A knowledge of de Keyser's work in Amsterdam was diffused via Salomon de Bray's *Architectura Moderna* (1631) and Philip Vingboons's engravings of his own work published in 1648.

Britain

Architectural treatises and pattern books imported from Italy, France and the Low Countries were a fount of inspiration for Renaissance architecture in Britain from the early sixteenth century. The first native architectural publication was John Shute's *First and Chief Groundes of Architecture* (1563), closely based on Serlio's account of the orders. Sir Henry Wotton's unillustrated *Elements of Architecture* is a wide-ranging essay, drawing on Alberti and Philibert de l'Orme as well as Vitruvius and incorporating personal observations of architectural practice in the Veneto. Another amateur production was John Evelyn's translation of Fréart's *Parallèle*(1665).

The later seventeenth and eighteenth centuries were the great period of Classically-oriented English architectural publications of the most diverse kinds: translations of foreign treatises, measured surveys of ancient and modern buildings, and British architects' publication of their own works. The English distrust of intellectualising theory and the absence of an architectural academy meant a lack of systematic rationalising treatises such as those of Perrault, Blondel and Durand.

Translations of Serlio (1611), Alberti (1723, Leoni), Palladio (1716, Leoni; 1738, Ware) and Vignola (1659) became available. Although a satisfactory translation of Vitruvius appeared only in 1771, acknowledgements of his and other writers' contributions (for example Scamozzi) on the Orders were common. The publication of *Vitruvius Britannicus* (1715–25), where Colen Campbell included his own designs and those of Inigo Jones, had an enormous influence on the Palladian revival. Lord Burlington published Palladio's drawings of the Roman baths (1730), and later publications of antiquities such as Wood's *Palmyra* (1753), Stuart and Revett's *Antiquities of Athens* (1762) and Robert Adam's *Spalato* (1764) gave an important impetus to neo-Classical architecture.

James Gibbs's *Book of Architecture* (1728) was primarily a compilation of his own designs and was widely used as a pattern book. Sir William Chambers's *Treatise on Civil Architecture* (1759, 1768, 1791) is perhaps the most ambitious and comprehensive of the English treatises (p.839). The publications which diffused the Classical style most widely through the ranks of ordinary builders were the handbooks such as Batty Langley's *Builder's Compleat Assistant* (1738) and *The Builder's Jewel* (1757), which enabled the simplest terraces to be built to a high standard of design.

Specialised model books for farm houses, cottages and villas were a feature of the growing taste for the Picturesque, and exotic styles became known through books such as Chambers's *Chinese Buildings* (1757). Finally, Gothic architecture began to be studied more seriously in antiquarian works, the most important of which is the *Attempt to Discriminate the Styles of English Architecture* (1817) by Thomas Rickman, who invented the enduring labels Early English, Decorated and Perpendicular.

Scandinavia

Suecia Antiqua et Hodierna (1693–1714), a series of engravings after drawings by the architect Eric Dahlberg (1625–1703), illustrates the great wealth of country houses built in Sweden in the seventeenth century. Lauritz de Thurah's sumptuous, two-volume *Danske (Danish) Vitruvius* (1746–9), although it included illustrations of his own work, must really be considered a graceful tribute to the wealth and supposed good taste of the Oldenburgs. Not until the publication of C. F. Hansen's *Samling af forskjellige offentlige og private Bygninger* (1847) do we find a Scandinavian architect publishing his own work in the way pioneered by the Adam brothers in Britain. Hansen was probably influenced, however, by the appearance of Karl Friedrich Schinkel's *Sammlung* (1825–).

Bibliography

BENEVOLO, L. *The Architecture of the Renaissance*. 2 vols. London, 1978.

BLUNT, A. *Baroque and Rococo Architecture and Decoration*. London, 1978.

HONOUR, H. *Neo-Classicism*. Harmondsworth, 1968.

MIDDLETON, R. and WATKIN, D. *Neo-Classical and 19th Century Architecture*. New York, 1980.

MURRAY, P. *Renaissance Architecture*. New York, 1971.

NORBERG-SCHULZ, C. *Late Baroque and Rococo Architecture*. New York, 1974.

Palladio e la sua eredità nel mondo. Exhibition catalogue. Vicenza, 1980.

Chapter 26

ITALY

Architectural Character

The architecture produced in Italy between 1400 and 1830 may be broadly divided into four main periods:

Early Renaissance—fifteenth century
High Renaissance and Mannerism—sixteenth century
Baroque and Rococo—seventeenth and early eighteenth century
Neo-Classical—mid-eighteenth to early nineteenth century

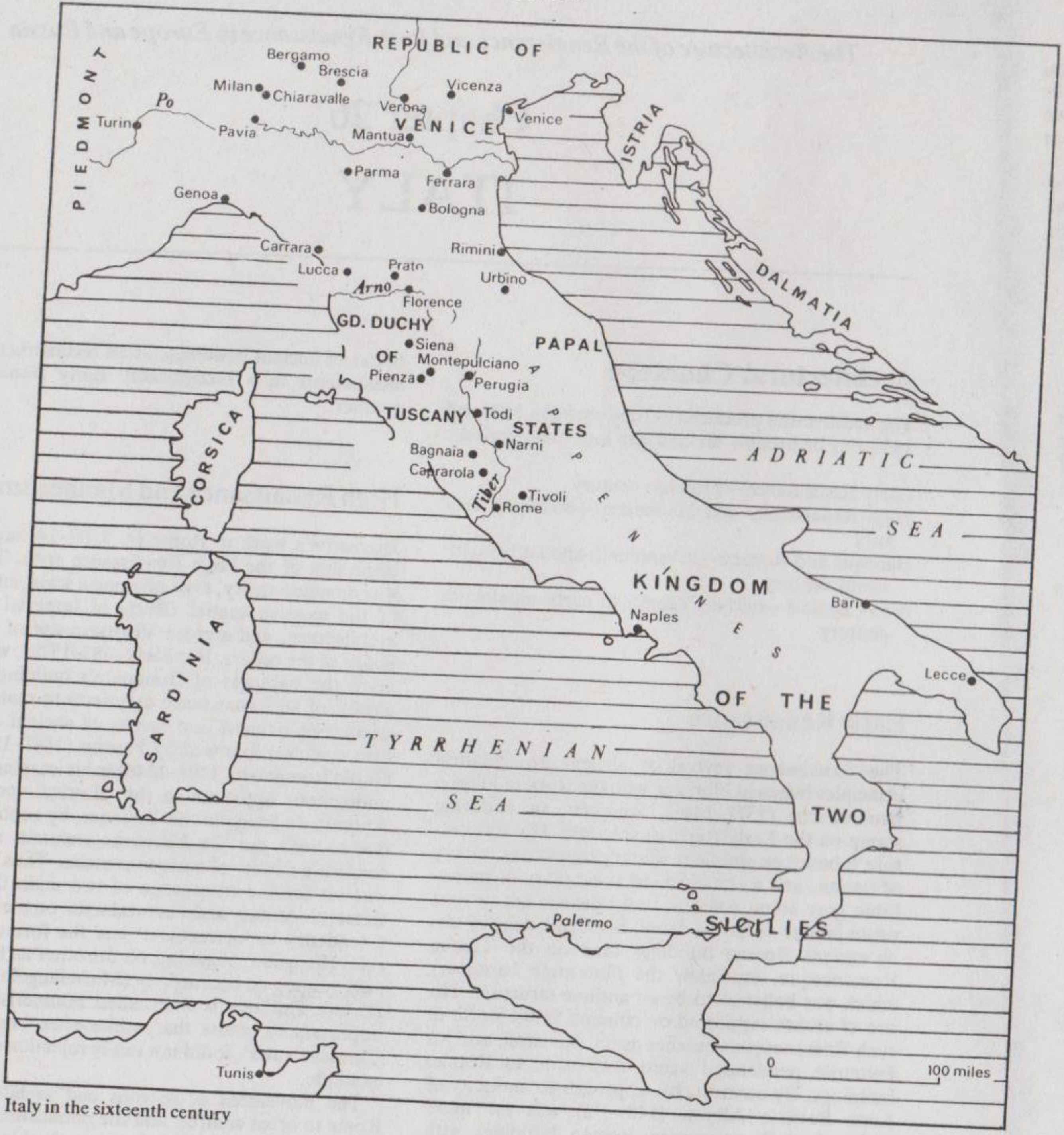
Early Renaissance

The Renaissance revival of ancient architectural principles began in Florence with the work of Filippo Brunelleschi (1377–1446), who set an enduring stamp on the Early Renaissance style. His architecture is based on simple modular proportions, clarity of design, and a standardised vocabulary of monolithic grey stone columns and pilasters set against white plaster walls. In detail, his forms depend less on ancient Roman buildings than on the Tuscan Romanesque, especially the Florentine baptistery which was believed to be an antique structure. His use of arches supported on columns is the norm in such Romanesque churches as SS. Apostoli, and his favourite pendentive vaults owe little to Roman buildings. By contrast, the approach to antiquity of Leon Battista Alberti (1404–72) was far more archaeological: comparing Roman buildings with Vitruvius's text, he introduced specific ancient features such as the triumphal arch and the temple front into his churches. He understood but was not hidebound by Vitruvius's account of the orders, and took care to combine arch with pier, and column with straight entablature, in the Roman manner. Alberti's career was peripatetic, and enthusiasm for the new architecture spread to patrons in Rome, Ferrara, Mantua, Rimini and Urbino. In the later fifteenth century architects like Giuliano da Sangallo and Francesco di Giorgio compiled extensive sketchbooks of ancient buildings, often reconstructing the monuments in a recognisably Early Renaissance manner.

High Renaissance and Mannerism

Bramante's work in Rome (*c.* 1500–14) marks the beginning of the High Renaissance style. The aim was monumentality, even on a small scale, emulation of the massive spatial effects of Imperial Roman architecture, and a more Vitruvian use of the language of the orders. Raphael (1483–1520), who criticised the bareness of Bramante's buildings, came closest of all Renaissance architects to realising the decorative richness and variety of ancient architecture, and was followed by Peruzzi (1481–1536) and Giulio Romano (*c.* 1499–1546) in his imaginative and undogmatic approach to the Classical vocabulary; Antonio da Sangallo the Younger, by contrast, tended to seek out the Vitruvian elements amid the confusing variety of antique remains. Thus the stage was set for the emergence of two main themes in sixteenth-century architectural style: on the one hand a tendency to 'correctness' and the formulation of rules (Sangallo, Vignola); on the other an inventiveness verging on eccentricity (Michelangelo, Ligorio, Alessi). The latter is often called 'Mannerist', but it is important to realise that, while often breaking the Classical 'rules', it did not imply rejection of ancient example.

The movement of patrons and architects from Rome to other centres, and the publication of architectural books and engravings, resulted in the rapid diffusion of High Renaissance forms throughout Italy and all over Europe. Sansovino (1486–1570) and Sanmicheli (1484–1559) took the new language to the Veneto, while Giulio Romano pursued more fanciful goals in Mantua. The two most influential architects of the mid century, Michelangelo (1475–1564) and Palladio (1508–80), seem to stand at opposite ends of the sixteenth-century spectrum. Michelangelo's plastic approach to the wall mass, his spatial innovations and fantastic sculptural detail, pave the way for the



Italy in the sixteenth century

1598

Baroque; Palladio's clear, harmonious proportions, masterly deployment of select, almost standardised antique forms, and commitment to systematic formulations of rules, made his buildings a model for Classicising architects all over Europe. Yet Michelangelo adhered firmly to a clear structural framework and the principles of symmetry, while Palladio, especially in his later buildings, permitted himself odd juxtapositions and the use of bizarre detail.

Baroque and Rococo

The movement, spatial invention, drama and freedom of detail associated with the Baroque are in some ways a delayed response to Michelangelo's achievement. Bernini (1598–1680) represents the theatrical, entrepreneurial side of the Roman Baroque, welding the arts of painting, sculpture and architecture into spectacular unified effects. Pietro da Cortona (1596–1669) was a very powerful designer, moving towards a strongly columnar architecture, marked by dramatic chiaroscuro.

The most revolutionary exponent of the Roman trio was Francesco Borromini (1599–1667), however, who attained heights of spatial complexity and of audacious curving surfaces equalled only by Guarino Guarini (1624–83) and Filippo Juvarra (1678–1736) in Piedmont, where Baroque had its late Italian flowering. In early eighteenth-century Rome some architectural and urban designs, such as the Spanish Steps (p.917A), possess a curvilinear elegance and sprightliness which may be called Rococo, but a vein of severe monumentality in the work of architects such as Ferdinando Fuga (1699–1782) and Alessandro Galilei (1691–1737) prepared the way for neo-Classical tendencies.

Neo-Classical

A Palladian-Scamozzian kind of Classicism had never entirely disappeared from the Veneto and was explicitly revived in the early eighteenth-century Venetian works of Andrea Tirali (1657–1737), G. A. Scalfarotto (1690–1764) and Giorgio Massari (1687–1766). The Venetian Franciscan theorist Carlo Lodoli (1690–1761), whose lectures were published in 1786, was a pioneer of the rationalising functionalist strand of neo-Classical thought. The Greek Revival, however, took little hold in Italy, for obvious reasons, Piranesi being the passionate champion of the Roman side in contemporary debates on the nature of Classicism. The megalomaniac vision of Roman architecture, expressed in Piranesi's engravings of ancient buildings and his 'carceri' series, was an enormously influential counterweight to Rococo frivolity. By the 1780s a more rigorous Classical style was firmly established in Italy, and the Napoleonic period brought a flurry of French-inspired neo-Classical public buildings, as well as grandiose town-planning schemes in Milan and elsewhere. Italian neo-Classicism, however, tended to be somewhat feeble and derivative; for the first time Italy was importing taste rather than generating the stylistic impetus for the rest of Europe.

Examples

Early Renaissance

Florence

Filippo Brunelleschi (1377–1446), credited in his own time with the reintroduction of the 'ancient manner of building', transformed the appearance of architecture in Florence and all over Italy, even though many of his works were incomplete at his death.

The **Dome of Florence Cathedral** (1420–34) (pp. 512, 514A), which Brunelleschi constructed without the use of centering supported by scaffolding, is his most famous achievement. The octagonal drum, pointed profile and double shell were settled before Brunelleschi won the competition, but he devised the spiralling courses of herringbone brickwork, sloping masonry beds and hoisting machines which made its construction possible. Although both shells are octagonal, their constructional geometry is circular, and the corner and intermediate ribs serve to join the shells, not to provide the main support as in a Gothic structure. Stone and timber chains were also used. Brunelleschi added (1438–) the semicircular exedrae with paired half-columns and niches at the base of the drum, and the elegant marble lantern with its double volute brackets, completed by Michelozzo and Bernardo Rossellino (1436–67). Herringbone brickwork continued to be used for Florentine domes, and the two-shell construction influenced S. Peter's, Rome (q.v.), and many subsequent domes in Europe.

The **Foundling Hospital, Florence** (1419–) (p. 852A), Brunelleschi's first building, already embodies his rational and systematic principles of design. The loggia (originally nine bays) is based on repeated modular elements, with sail vaults supported on monolithic grey stone columns and semicircular arches. The vocabulary, while probably aiming at an 'antique' effect, is close to the Tuscan Romanesque of such buildings as S. Miniato (p.317A), SS. Apostoli, and especially the baptistery, then thought to be a Roman building. The ground-plan of the hospital behind, with two cloisters, church and dormitories, is governed by modular and mathematical proportions and is roughly centralised, without being symmetrical. The main hospital and the side bays of the facade were not executed by Brunelleschi.

S. Lorenzo, Florence (1421–) (p.847G–L), has a complicated design and building history, as much influenced by the prior, the parishioners and the Medici family as by Brunelleschi. The west (liturgical east) end was started first, with square sail-vaulted chapels and a sacristy grouped around the domed crossing and transepts. The Old Sacristy, which doubled as a Medici funerary chapel, is essentially a cube, with a hemispherical umbrella dome supported on pendentives, and a smaller domed altar chapel with concave niches.

Donatello added pedimented doors leading to the service rooms and completed the sculptural decoration in a plastic, polychrome style which blurred the clear grey on white articulation of Brunelleschi's design. The main body of the church (1442–), mostly built after Brunelleschi's death, is basilican in form, its central arcaded flat-ceilinged space flanked by sail-vaulted side aisles, and shallow dark side-chapels added after 1463. The nave is brightly lit from clerestory windows and oculi in the aisles, and has Brunelleschi's characteristic restraint of detail. (For Michelangelo's New Sacristy and library in the cloister, see p.888.)

A comparison with his other basilican church, **S. Spirito, Florence** (1436–) (p.849A–E), shows the maturing of Brunelleschi's style in a plan which he himself described as 'fulfilling his intentions'. Here the square sail-vaulted aisle-bays and the semicircular side-chapels continue right round the centralised crossing, giving the plan a modular unity not found at S. Lorenzo. The exterior-interior correspondence is marred by later decisions to wall in the side-chapels, originally curved on the exterior, and to replace Brunelleschi's four doors with a more conventional three-doored facade. (For the sacristy, see p.853.)

The **Pazzi Chapel, S. Croce, Florence** (1429–61) (p.847A–F), is in many ways the perfect Brunelleschian building, though much of it was constructed after his death. The plan extends the square of the Old Sacristy by two barrel-vaulted bays to meet the requirements of a chapter house. The grey and white articulation of the interior, each element clearly distinct, and the glazed terracotta roundels (by Luca della Robbia and others) are in keeping with Brunelleschi's aesthetic. It is not clear whether the delicate colonnaded porch with its central arch and panelled upper storey in any way reflects a Brunelleschi design.

The **Oratory of S. Maria degli Angeli, Florence** (1434–7), is one of Brunelleschi's most influential buildings, despite its truncated state. An octagonal interior is ringed by interconnecting square chapels with apsidal ends, resulting in a sixteen-sided exterior eaten away by niches. The more plastic approach to the wall mass suggests a renewed influence of ancient Roman architecture, though connections with the fourteenth-century crossing arms of Florence Cathedral have been pointed out. The unfinished structure was brutally restored in the 1930s.

The great hall of the **Palazzo di Parte Guelfa, Florence** (*c.* 1430–), is Brunelleschi's only surviving wholly secular building, and is also incomplete. It is notable for the use of pilasters on the interior.

Michelozzo di Bartolommeo (1396–1472), the favourite architect of Cosimo de'Medici (1389–1464), though younger than Brunelleschi, continued to mix Gothic and antique elements in an architectural style that has been characterised as one of 'allusive contrast'; he used polygonal piers and groin vaults along with capitals and mouldings more consciously based on Roman examples than those of Brunelleschi. He worked in Ragusa (Dubrovnik) after being dismissed from the cathedral works. At **S. Marco, Florence** (1437–), Michelozzo redesigned much of the church and convent for the Observant Dominicans, at the request of Cosimo de'Medici. The church (transformed in the eighteenth century) was a simple aisle-less hall with a polygonal groin-vaulted altar-chapel and half the interior was screened off as a monks' choir. The most remarkable element of the monastery building, largely executed in a simplified Brunelleschian style, is the Library (1457–), with its airy Ionic arcades, narrow barrel-vaulted central space, and groin-vaulted side aisles for the desks.

The **Medici Palace (Palazzo Riccardi), Florence** (1444–) (p.851), set the pattern for fifteenth-century Tuscan palace design. The plan, while not fully symmetrical, is organised around a central arcaded courtyard of modified Brunelleschian style with a garden at the back. An internal staircase leading off the courtyard rises to the main living quarters on the first floor, which are organised in suites of apartments containing interconnecting rooms of diminishing size. The second and attic storeys were used for children, services, and so on. The exterior is faced with stone, graduating from heavy rustication on the ground floor to smooth ashlar on the second floor, and is crowned with the first 'all'antica' cornice found in a domestic building. The two-light windows divided by columns are Renaissance versions of those on the Palazzo della Signoria (q.v.). The ground floor 'kneeling' windows in the filled-in loggia are by Michelangelo (1516–17), and greatly influenced later Tuscan window design. The palace was extended in 1680 by the Riccardi family, who added six window bays to the original eleven.

Michelozzo also adapted country buildings into **villas** for the Medici at **Trebbio, Careggi** and **Caffagiolo**. These all retain some mediaeval elements such as towers, machicolations and octagonal piers, though Careggi opens out to the countryside at the back, with arcaded loggias in the Renaissance manner. The **Villa Medici at Fiesole** (1458–61, much transformed) was influential in the history of villas for its exploitation of the hillside site with front-and-back loggias and terracing.

The circular tribune (a monks' choir ringed by chapels) at **S. Annunziata, Florence** (1444–), Michelozzo's most antique-influenced design, can be compared to the so-called Temple of Minerva Medica in Rome (Orti Liciniani). It was completed in altered form under the supervision of Alberti.

Leon Battista Alberti (1404–72), a polymath and scholar turned architect, wrote (by 1452) the first full-length architectural treatise since Vitruvius (printed 1485–6). He based the activity of the architect firmly in a social and political context, provided a wealth of practical information, and, above all, introduced an architectural aesthetic based on order and proportion, extending Pythagorean whole-number musical ratios to the visual arts. He was the first to understand the Vitruvian orders, adding to them the Italic (Composite) from his own observations of ancient buildings.

In his first building, **S. Francesco, Rimini** (*c.*

whole building is raised on an arcaded podium, and the entrance vestibule, originally reached by a straight double-ramp staircase (the present curving stairs were built in the nineteenth century), carries an embedded triangular pediment like a temple-front, the first appearance of this motif in domestic architecture. Sangallo experimented here, as at his own house in Florence (**Palazzo Panciatichi-Ximenes**, 1490–) and the **Palazzetto Scala** (1472–80), with cast stucco vaults of Romanising design.

The **Palazzo Gondi, Florence** (1490–1501) (p.843A), has a particularly sophisticated form of smooth rustication on the facade, the voussoirs subtly keyed into the surrounding blocks. The ornament is of high quality, and the staircase is, unusually for Florence, built into the arcade of the courtyard. The palace was enlarged in the nineteenth century by Giovanni Poggi.

Sangallo made the wooden model for the **Palazzo Strozzi, Florence** (1489–) (p.855), still kept in the building today. The most ambitious of all fifteenth-century Florentine palaces, it has a completely symmetrical plan, the two halves being intended for different brothers. The palace is taller in reality than in the model, with vaulted upper rooms. The building was supervised by the stonemason-architect Cronaca (Simone del Pollaiuolo, 1457–1508), who designed the splendid courtyard and the crowning cornice, based on a Roman example from Trajan's Forum. The facade is somewhat monotonous, but relieved by Caparra's elegant ironwork.

Cronaca's **Palazzo Guadagni** (1504–6) (p.850F) set the pattern for the simpler palaces of the sixteenth century in Florence, its stonework confined to the rusticated voussoirs and quoins. The crowning loggia for shade and air is also characteristic.

Mantua

Alberti's churches in Mantua, designed for Marquis Ludovico Gonzaga, are reinterpretations of ecclesiastical architecture in antique terms. **S. Sebastiano** (1460–) is a Greek-cross votive church raised over a high crypt packed with piers. The facade (the steps are modern) is a flattened temple front articulated with four pilasters, the central window breaking into the pediment. It is a puzzling structure, never completed, and marred by twentieth-century restorations.

S. Andrea, Mantua (1470–) (p.849F–K), described by Alberti as his 'Etruscan temple' fulfils many of his ideas about sacred architecture, though it was largely constructed after his death. The executant architect, as at S. Sebastiano, was the Florentine Luca Fancelli, court architect to Ludovico Gonzaga. The deep entrance portico, which mirrors the nave articulation but does not mask the whole facade, is a combined triumphal arch and temple front, articulated with pilasters. The magnificent barrel-vaulted nave is supported by very thick side walls pierced by large barrel-vaulted side chapels alternating with chambered piers, a more massively Roman effect than any yet seen in Renaissance architecture. It is unclear whether the eighteenth-century transepts and choir in any way reflect Alberti's conception; the dome is by Juvarra (completed 1763).

Bernardo Rossellino (1407/9–63), a Florentine sculptor by origin, and designer of the strongly architectural **Bruni Tomb** (1445) in **S. Croce, Florence**, was apparently Alberti's executant architect at the Palazzo Rucellai, Florence (q.v.). He worked for Pope Nicholas V, the dedicatee of Alberti's architectural treatise, on the new crossing area planned for S. Peter's, Rome (1450–).

At **Pienza**, where Pope Pius II transformed the centre of his native village into a miniature Renaissance city, Rossellino rebuilt the **Cathedral** (1459–) as an Italian version of the German hall-churches admired by Pius in his travels. The facade has an ingenious if uncanonical use of superimposed columns flanking wide buttress-like piers. The facade of **Palazzo Piccolomini** (p.856) is a coarse version of the Palazzo Rucellai, with the rustication carried over the lower pilasters. The interior planning, however, is more interesting, and superimposed loggias on the garden facade overlook the valley and Monte Amiata. Together with Rossellino's redesigned **Palazzo Communale**, and reworked **Palazzo Vescovile**, both buildings face on to a harmonious city square.

Strongly influenced by the Palazzo Piccolomini was the second phase of the **Palazzo Ducale at Urbino** (first phase 1450–; second phase 1465–) (pp.852B, 856E), the outstanding building of the third quarter of the century. With Luciano Laurana (1420/5–79) as his architect, Federigo da Montefeltro united his scattered residences in a loosely composed group, unified by the harmonious and majestic central courtyard, Brunelleschian in its inspiration, but turning the corners with clustered piers. The public face of the palace on the city square was to be grandly articulated with a stone facade, while the intimate apartments on the valley side, including the marquetry-lined studiolo, are turned to enjoy the view; here elegant superimposed loggias are flanked by romantically mediaeval round towers. The interior plan, with its grand staircase and suites of interconnecting rooms forming apartments, became the inspiration for such Roman palaces as the Cancelleria (q.v.), but the stone ornament of window and door frames, fireplaces and vaults, here reaches an unsurpassed pitch of refinement.

Francesco di Giorgio (1439–1501), a Sienese painter and bronze sculptor, became the most seminal fifteenth-century designer and theorist of fortifications, and a highly influential architect working in Urbino and Naples as well as his native Siena. He

1450–) (p.856A), often called the Tempio Malatestiano, Alberti himself designed only the outer shell, the interior being simultaneously transformed from its Gothic appearance by his site architect, Matteo de'Pasti. The incomplete facade is inspired by the Arch of Augustus at Rimini, and the side arcades supported on piers are also strongly Roman in form. Alberti intended there to be a Pantheon-type dome, but construction was abandoned before the death of the patron, Sigismondo Malatesta, who had brought the remains of the neo-Platonic Greek philosopher, Gemistos Plethon, to be entombed in the side recesses along with other figures from the court.

In his native city, Florence, Alberti designed the facade of the **Palazzo Rucellai** (*c.* 1453–) (p.850G), the first domestic building articulated with Classical orders—Doric for the ground floor and two varieties of Corinthian for the upper storeys. Originally five bays, the palace was extended as the patron acquired more property, and left incomplete. The delicate and refined network of pilaster orders over drafted masonry, with the patron's emblems inserted in the friezes, does not correspond with the actual blocks of masonry; thus the use of the orders is purely ornamental. The executant architect was probably Bernardo Rossellino, and Alberti did not contribute to the plan or interior design.

For the same patron, Giovanni Rucellai, Alberti completed the polychrome marble **facade of S. Maria Novella, Florence** (1456–70) (p.518A), incorporating the pre-existing mediaeval elements into his design. Here the volutes planned at S. Francesco, Rimini, are used for the first time to mask the aisle roofs—a highly influential solution. (For Alberti's Mantuan churches, see p.854.)

The **Palazzo Pitti, Florence** (1458–66) (p.850), was designed for Luca Pitti, a rival of Cosimo de'Medici. The original seven-bay structure is notable for its massive rustication and regular placing of windows and doors, each storey recessed behind a continuous balustrade. A large private piazza was cleared in front of the palace. Purchased by the Medici in 1549, the building was enlarged by Ammannati (1558–70), who added the courtyard, continuing the robust mood with the rusticated orders made fashionable by Giulio Romano and Serlio. Ammannati's interior planning was a response to the much more complex needs of the Ducal household, the increasing size of which necessitated further enlargements by G. and A. Parigi (1620–40), the outer wings being added by F. Ruggieri (1764–83). The Boboli Gardens behind were also successively elaborated by the Medici, with grottoes (the work of Buontalenti), fountains, statuary and a grassy amphitheatre.

The **Badia Fiesolana**, outside Florence, is one of the most intriguing buildings of the mid-century. Traditionally attributed to Brunelleschi, the church (1461–) is closer in general plan to Alberti's S. Andrea, Mantua (q.v.), with its unlit aisleless barrel-vaulted nave and dark side chapels, the light being concentrated at the crossing and east end; the ornament, however, is sparse but Brunelleschian. The abbey itself was closely supervised by the patron, Cosimo de'Medici; the architect is again unknown.

Giuliano da Maiano (1432–90) was one of several woodworker-architects in Renaissance Florence. The **Palazzo Pazzi-Quaratesi** (*c.* 1460–9) (p.850E) combines influences from Brunelleschi (attic oculi) and the Palazzo Pitti with refined decorative detail reminiscent of the Palazzo Ducale at Urbino (q.v.); it has an imaginative courtyard with closed back wall and hanging garden.

Giuliano da Maiano also designed the **Palazzo Spannocchi in Siena** (1473–), taking the biforate windows and 'all'antica' cornice of the Medici palace and the smooth channelled masonry of the Rucellai palace to the rival Tuscan centre. His **Cathedral at Faenza** (1474–) is an excessively horizontal and unwieldy structure with wide side-aisles and side-chapels, the nave a series of huge square sail-vaulted bays. (For Maiano's work in Naples, see p.866.)

Giuliano da Sangallo (1443–1516) was the most gifted Florentine architect of the second half of the fifteenth century. Also trained as a woodworker, he specialised with his brother Antonio (q.v.) in architectural models; they also worked together on fortifications. Sangallo was taken up by Lorenzo de' Medici (1449–92) to give built form to the 'Magnifico's' exceptional architectural interests. On Lorenzo's recommendation he gained the contract for **S. Maria delle Carceri, Prato** (1485–) (p.852D), a new church built to house a miraculous image. Like other such churches in the Renaissance, it is domed and centralised; the Greek-cross plan is adapted from Alberti's S. Sebastiano. The interior pilaster capitals are characteristically bizarre and ornate. Similar capitals, based on antique figurated types drawn by Sangallo in Rome, are found at the **Sacristy of S. Spirito, Florence** (1489–), avowedly based on the baptistery, but in plan closer to the so-called 'Baths of Viterbo', a favourite antique building of Giuliano's. The stone barrel-vaulted columnar vestibule laid transversely recalls early Christian narthexes, but is far more monumental in conception.

At **S. Maria Maddalena dei Pazzi, Florence** (1488–) (p.856D), Sangallo showed his awareness of Albertian principles by using the column and lintel system for the cloister (1491–), supporting the corners and entrance arches on piers. The droopy Ionic capitals are based on extant Roman examples in Fiesole.

For Lorenzo's private use Sangallo designed the **Medici Villa at Poggio a Caiano** (1485–), the first attempt to apply Vitruvian and Albertian principles to villa design. The plan is square and perfectly symmetrical, with four corner apartments, the front and back wings joined by a two-storey barrel-vaulted salone (the arrangement was to influence Inigo Jones's Queen's House, Greenwich; q.v.). The wrote two versions of an illustrated treatise on architecture and fortifications and left many drawings of ancient buildings.

In Urbino, Francesco continued work at the Ducal Palace, being responsible for the city facade as well as completing the courtyard and adding stables and a spiral ramp staircase. His design for the Duomo is now concealed by Valadier's alterations. The church of **S. Bernardino** (1482–) is Francesco's most complete surviving building in Urbino. Built as a mausoleum for Federigo da Montefeltro, it has a single barrel-vaulted nave leading to a square domed crossing where four free-standing columns support the pendentives. Originally all three arms of the crossing were apsidal; the altar chapel has since been extended. A characteristically Urbinate inscription in Roman capitals runs round the frieze of the interior—one of the most lucidly articulated spaces of the fifteenth century in Italy.

S. Maria di Calcinaio, Cortona (1484–) (p.852C), built to commemorate a miracle, is a simple aisleless Latin cross with octagonal dome over squinches and a barrel-vaulted nave. The walls are massive, to support the vault, and have semicircular side-chapels carved out of their thickness. A very sparing use of continuous mouldings running round the interior gives it a strong sense of cohesion.

The same characteristics are found in Francesco's fortresses for Federigo da Montefeltro (such as **S. Leo** (p.857A), **Sassocorvaro**), which combine a pioneering approach to defence against artillery with a foreboding but elegant robustness of design.

Milan

Florentine architectural forms reached Milan in the second half of the fifteenth century. The **Portinari Chapel, S. Eustorgio** (1460s), is essentially based on Brunelleschi's Old Sacristy, San Lorenzo, Florence (q.v.), but decorated with exuberant illusionistic paintings and reliefs, and on the exterior with pepper-pot turrets and an elongated lantern.

Antonio Averlino, called Filarete (*c.* 1400–69), received his early training as a goldsmith and sculptor in his native Florence, under Lorenzo Ghiberti (1378–1455). His most important sculptural work, the bronze door of S. Peter's in Rome, was completed in 1445. By 1451 he was resident in Milan, where in addition to being employed on the architectural projects of Duke Francesco Sforza (1401–66) he composed a curiously original *Treatise on Architecture* (*c.* 1460–64) which describes the building of the imaginary city of Sforzinda.

The **Ospedale Maggiore in Milan** (p.858F,H), begun in 1456 but not completed until the eighteenth century, is Filarete's greatest achievement and one he describes in his *Treatise* (Bk XI, fol. 79r ff.). Perhaps influenced by the Spedale di Santa Maria Nuova in Florence, which the patron, Francesco Sforza, sent him to see, Filarete designed two large cruciform wards separated by a huge central cloister. Under the domed crossing of each ward there was an altar, so that all patients could see the mass. Cloisters between the ward arms gave access to light and air, and also gave the building its sense of thorough integration between the parts.

Donato Bramante (1444–1514), later to be the founder of the High Renaissance architectural style in Rome, worked as architect for the Sforza Dukes of Milan for twenty years (*c.* 1477–99). Born near Urbino, and trained as a painter, his early specialism in illusionistic perspective informed his whole architectural career.

S. Maria presso S. Satiro, Milan (1476–), founded to commemorate a miraculous image in the adjacent ninth-century Greek-cross oratory, S. Satiro, is built on a restricted site exploited by Bramante for perspective effect. A short barrel-vaulted aisled nave, of deceptively grand appearance for its size, is attached to a long domed transept, like an elongation of Brunelleschi's Pazzi Chapel; this leads into S. Satiro, which was reworked in fifteenth-century idiom. The apparently barrel-vaulted altar-chapel is entirely illusionistic. The ornament throughout is in terracotta, as was customary in Milan. The sacristy (1488), close in plan to the sacristy of S. Spirito in Florence (q.v.), has upper galleries and is richly ornamented in terracotta by Agostino di Fonduti.

At **S. Maria delle Grazie, Milan** (p.858A–E), Bramante added a 'tribune' (domed crossing and choir, 1493–) to the nave built by Guiniforte Solari in a largely Gothic idiom (1463–). Intended as a mausoleum for the Sforza dukes, the interior of the square crossing is like a vastly expanded version of the altar chapel in Brunelleschi's Old Sacristy, with the side walls opening into semicircular arms crowned by half-domes. The drum recalls the attic of the Pantheon, but the flat illusionistic decoration is very quattrocento in character. The choir arm, covered by an umbrella vault, is lit through circular windows over the half-domed apse. In this building the limits of Brunelleschian spatial effects have been reached. On the exterior (attributed to Amadeo) the drum is built up into a galleried sixteen-sided structure, and the dome is concealed, in Lombard fashion, behind a conical roof, the whole encrusted with Lombard terracotta work.

Bramante projected an even grander design (largely unrealised) for **Pavia Cathedral** (1488–), an enlarged version of Brunelleschi's S. Spirito, Florence (q.v.), boldly conceived in terms of assembled masses. At **S. Ambrogio, Milan**, Bramante added the Doric and Ionic cloisters in the 1490s, showing a new awareness of Vitruvian considerations, while in the Canonica he uses playful tree-trunk columns alluding to the origins of the orders. The triumphal arch motif found here also appears at **S. Maria at Abbiategrasso**

(1497), and at the **Piazza Ducale at Vigevano** (mid-1490s), a huge city square laid out by Bramante with continuous arcades covered with illusionistic painting.

S. Maria della Croce, near Crema (1493–), by G. Battagio, is one of several interesting centralised churches in Lombardy. A simple, but large, round domed church, it has four subsidiary arms arranged like a Greek cross. Superimposed galleries pierce the outer drum, which bears imaginative terracotta decoration.

The **Certosa di Pavia** (1396–) (p.857C) was begun in Gothic style, following a Lombardo-Romanesque plan, reorganised with more systematic geometric proportions. The galleried cupola over the crossing is a reworking in early Renaissance vocabulary of the Gothic lantern at Milan cathedral. The west front (1491–), designed by Amadeo (1447–1502), is the most elaborate marble facade of the fifteenth century, remarkable more for its exquisite sculptural detail than for its overall conception.

The **Colleoni Chapel, Bergamo** (1470–3) (p.861), an early building by Amadeo, is the burial chapel of Bartolommeo Colleoni, the famous mercenary general. The fusion of Milanese and Venetian decorative work and the accumulation of festive polychrome decoration on the exterior obscures rather than articulates the architectural form, but the sheer range of the ornamental vocabulary is remarkable.

Rome

Early Renaissance architecture was launched in Rome by Nicholas V (Pope 1446–55), whose plans for the city included restoration of the ancient churches, rebuilding the choir of S. Peter's, restoring the aqueducts and extending the habitable areas within the Aurelian walls. This sketchy blueprint for the city's development was filled in by successive popes, culminating in the work of Sixtus V.

The **Palazzo Venezia, Rome** (1455–) (p.856C), and the titular church of **S. Marco** it incorporates (*c.* 1460–50), were, with the old **Benediction Loggia** at S. Peter's (1461–), the first notable examples of Renaissance building in Rome. The corner tower, L-shaped plan and cross-mullioned windows of the Palazzo Venezia, characteristic of fifteenth-century cardinals' palaces, seem conservative. However, the unfinished courtyard and the facade of S. Marco have the ancient Roman combination of arches on piers with trabeated half-columns (as in the Colosseum or the Theatre of Marcellus, Chapter 9). A delightful walled garden which was originally attached to the corner of the building was moved to the side of the piazza in the 1930s. The executant architect here and at the Benediction Loggia was Francesco del Borgo.

Unlike Brunelleschi's basilicas in Florence, Roman fifteenth-century churches generally have groin-vaulted naves. The most impressive is **S. Maria del Popolo** (1472–), built by Sixtus IV (Pope 1471–89), which gives a Roman vocabulary to the Gothic basilican form. Massive piers with squat attached half-columns support the nave arcade, delightfully embellished by Bernini in the seventeenth century. The square chapel and apsidal choir behind the altar were added by Bramante (1507–), giving some idea of his intended apse for the choir of S. Peter's (q.v.).

The **Ospedale di S. Spirito, Rome** (1474–82), is a well-balanced design commissioned from an unidentified architect by Sixtus IV. The wards extend either side of a central chapel; the additional ward extending at the rear, although not built until later, was probably part of the original scheme, and indicates the derivation from Lombard and Tuscan cross-plan hospitals, such as S. Maria Nuova in Florence. The exterior, fronted by a long loggia, treated with simplicity and restraint, combines Renaissance forms with such Gothic forms as octagonal piers and cusped window tracery.

S. Agostino, Rome (1479–83), built by Jacopo da Pietrasanta, has a very high nave with large clerestory windows; every second pier is articulated, with a half-column and minor order above supporting the groin vault. The semicircular side-chapels were originally expressed on the exterior. On the facade giant flowery volutes join nave to side aisles.

S. Maria della Pace, Rome (1478–83) (p.857B), a pilgrimage church built under Sixtus IV's patronage, has a short two-bay aisleless nave with side chapels leading to an octagonal domed 'tribune' ringed with chapels moulded, as in the nave, out of the thickness of the massive walls. The semicircular porch, facade and approach road are by Pietro da Cortona (q.v.), and the Ionic and Corinthian square cloister is one of Bramante's early Roman works (1501–4).

The most influential palace of the later fifteenth century in Rome was the **Cancelleria** (*c.* 1485–) (p.862), architect unknown, perhaps by Baccio Pontelli (1450–92/4), a Florentine who had worked in Urbino and designed fortifications in Rome in these years (his major work is the fortress at Ostia). The large wedge-shaped site incorporates the church of **S. Lorenzo in Damaso**, also completely rebuilt by the patron, Raffaelle Riario. Shops line a subsidiary facade, and the traditional Roman corner towers have become slight projections. The cladding is delicate drafted travertine, articulated on the upper storeys with a triumphal-arch rhythm of Corinthian pilasters, and labelled with a long Latin inscription. The doorways are later, that on the left by Domenico Fontana (1589). The large rectangular courtyard has two airy arcades in ornamented Doric, with piers at the corners, and a closed, Urbino-like upper storey, while the planning of apartment suites on the piano nobile and the connection with the church also recall Urbino. The quality of detail is exceptionally refined.

Venice

Gothic modes of building survived in Venice to the middle of the fifteenth century. The first structure modelled on antiquity is the **Porta dell'Arsenale** (1460), based on the Roman arch at Pola (q.v.).

The unfinished **Ca' del Duca** (1445–61), probably by Bartolomeo Buon (q.v.), begun for the Duke of Milan, is, with its diamond-faceted rustication and corner columns, an explicit attempt to introduce 'modern' forms into Venice.

The **Chancel Chapel of S. Giobbe**, added in the 1460s to this new Franciscan church (1450–), imports Brunelleschian spatial effects.

The greatest Venetian architect of the fifteenth century was Mauro Coducci (*c.* 1440–1504), who combined technical brilliance and a knowledge of Alberti's work with a respect for Veneto-Byzantine forms.

S. Zaccaria, Venice (p.863A), where Coducci completed (1483–) a church (largely by A. Gambello) begun in 1444, has a curious nave colonnade raised on high polygonal bases, and an ambulatory around the Gothic choir. The top half of the facade, marked by much more confident and structural handling of the orders, is Coducci's contribution to the exterior. The clustering of windows at the centre is borrowed from Venetian palace facades, and the emphatic projections and strong effects of light and shade were to continue to characterise Venetian architecture in the sixteenth century.

S. Michele in Isola (completed 1478), a monastic church with choir gallery at the west end, has a flat, brilliant white Istrian stone facade with channelled masonry continuing across the giant pilasters. The crowning semicircular pediment with volutes is echoed (as at S. Zaccaria) by segmental gables hiding the aisle roof. The enchanting hexagonal chapel to the left was built in 1527–43 by Guglielmo dei Grigi.

Coducci's other churches are reworkings of the Byzantine quincunx plan (central dome with four corner domes) found at S. Marco, domed spaces being a hallmark of the Venetian Renaissance. **S. Maria Formosa, Venice**, rebuilt by Coducci (1492–1504), partially follows the traditional plan of the eleventh-century church, but transforms it into a shortened Latin cross with domed crossing and tri-lobed apse. The interior is a loosely connected sequence of individually vaulted spaces, now brightly lit from (later) oculi.

S. Giovanni Crisostomo, Venice (1497–1504), a small parish church on a crowded site, is a more compact version of the quincunx plan, with three additional eastern chapels. The piers are oddly divided into vertical sections, the subsidiary domes springing from the upper imposts.

Giorgio Spavento's magnificent and airy **S. Salvatore, Venice** (1506–), is composed of three quincunx units, with three identical domes, fused to form a longitudinal church with nave and side aisles. The ingenuity of the plan is matched by the controlled logic of the interior articulation.

S. Maria dei Miracoli, Venice (p.864A–E), by Pietro Lombardo (1481–9), combines the functions of a nunnery church with the celebration of a miraculous image. It has a timber barrel-vaulted nave without side aisles and a raised choir with a pendentive dome. Both interior and exterior are clad in panels of richly-coloured marbles. Similarly decorative marble work is seen at the **Ca Dario** (*c.* 1488), dedicated by its inscription to the genius of the city (*genio urbis*). Serpentine columns and roundels sliced from antique porphyry embellish the facade, where the clustered windows lighting the salone are pushed asymmetrically to one side.

The facade of the **Scuola di S. Marco, Venice** (1488–95; built as a confraternity hall, now a hospital) (p.863C) was successively designed by Giovanni Antonio Buora, Pietro Lombardo, and Coducci (who added the effervescent crowning storey). The effect is of a pictorial composition in coloured marbles, heightened by the perspectival scenes flanking the two portals. At the **Scuola di S. Giovanni Evangelista**, Coducci built the most spectacular surviving staircase of the fifteenth century (1498), with its smoothly barrel-vaulted flights and domed landing supported on free-standing corner columns.

The **Palazzo Corner Spinelli, Venice** (*c.* 1485–90), attributed to Coducci, is the most attractive and consistently designed of Venetian quattrocento palaces. The ground floor is faced with drafted masonry punctuated by contrapuntally-placed narrow windows; the upper storeys use biforate windows paired in the centre and single at the sides to light the salone and bedrooms. The building is unified vertically by the superimposed corner pilasters and horizontally by continuing the balustrade and balconies as wide string courses. A particularly elegant touch is the tri-lobed curve of the side balconies on the piano nobile.

The **Palazzo Vendramin-Calergi** (*c.* 1500–8) is also attributed to Coducci and is the culmination of his career, achieving a High Renaissance clarity of design with a quattrocento vocabulary. The colossal and very sculptural facade is a tripartite grid with clustered openings in the centre and paired Corinthian half-columns articulating the side bays. The triumphal-arch effect is emphasised by the garlands linking the capitals on the piano nobile, while the heavy crowning entablature is punctuated with sculptured reliefs which carry up the line of the columns.

Venetian quattrocento skill at large-scale pictorial effects is summed up in Bartolomeo Buon's **Procuratie Vecchie** (1514–), giving a uniform facing to the left side of Piazza S. Marco, and by the **Torre dell'Orologio** (1496–9, perhaps by Coducci) which closes the vista of the Piazzetta S. Marco in a picturesque manner.

The **Palazzo del Consiglio, Verona** (1476–92) (p.880H), architect unknown, is the most notable fifteenth-century building in that city. The eight-bay colonnaded loggia is symmetrical around a centrally placed pilaster, with further pilasters placed at the corners (on the left an additional arch gives the effect of a triumphal entrance in the manner advocated by Alberti). The closed upper storey has four wide biforate windows flanked by pilasters, two of them supported by bracket capitals in the spandrels of the ground floor arcade. The highly consistent but unorthodox design is reminiscent of Coducci's work in Venice.

The **Palazzo della Loggia, Brescia** (begun 1492) (p.863B), is one of the outstanding public buildings of Renaissance Italy, only equalled in the sixteenth century by Palladio's Basilica in Vicenza. The balloon-like wooden roof (reconstructed) is modelled on the fourteenth-century Palazzo della Ragione at Padua. The massive lower storey combines a confidence in handling the Roman Colosseum-style arcading with an exquisite attention to detail. The upper floor, modified after a fire (1550–60), with its majestic trabeated windows (by Palladio), pilasters with candelabra decoration and crowning statuary, continues this refined idiom.

The **Palazzo Bevilacqua, Bologna** (*c.* 1480–), is chiefly notable for its diamond-faceted rustication and for the fluted columns in the courtyard. The **Palazzo del Podesta, Bologna** (1485–1500), has even more unusual rose-petalled rustication on the piers of its arcade, and rusticated windows divided by pilasters on the upper storey.

Ferrara was twice expanded in the fifteenth century with additional quarters created in the west by Duke Borso d'Este (1413–71) and the whole northern part of the city added (1492) under Duke Ercole (1471–1505).

Biagio Rossetti (1447–1516) was the ducal architect, planning a whole series of buildings from monastic and parish churches to terrace housing. His churches, such as **S. Francesco** (p.868A), **S. Benedetto** and **S. Cristoforo** are clearly planned and soberly eclectic with much use of domes and domical vaults. The most interesting palace in the Addizione is the **Palazzo dei Diamanti, Ferrara** (1493–), on a corner site with a scarped base, highly decorated corner pilasters with balcony, and two facades covered in diamond-point rustication. (For a late sixteenth-century derivative, see the **Palazzo dei Diamanti, Verona** (1580), p.880G.) Rossetti's own house, the **Casa Rossetti, Ferrara**, is an enlarged version of a single Emilian row house with terracotta trim.

Naples

Naples under its fifteenth-century Aragonese rulers was an important centre of humanist culture.

The **Aragonese Arch at the Castel Nuovo** (1452) celebrates the entry of King Alfonso I and is the first Renaissance monument in Naples. Superimposed triumphal arches alternate vertically with zones of sculpture showing Alfonso in triumph and the virtues of his rule. A later gate, the **Porta Capuana** (1485, by Giuliano da Maiano), is also antique in inspiration.

Most of the fifteenth-century buildings in Naples are lost, including the highly influential **Villa of Poggio Reale**, designed by Giuliano da Maiano (1487–) with advice from Lorenzo de'Medici. This had a four-towered main block with a colonnaded sunken courtyard surrounded by theatre-like stepped seating giving on to terraced gardens overlooking fishponds and incorporating antique-style baths. A version of the building was published by Serlio, and its layout of terracing and gardens influenced the Villa Madama, Rome (q.v.).

High Renaissance and Mannerism

Rome, 1500–1540

The High Renaissance begins with the work of Bramante in Rome.

Bramante's **Tempietto** in the cloister of **S. Pietro in Montorio, Rome** (1502) (p.867A–C), is a tiny but impressive building with a severity and antiquarianism new to Renaissance architecture. The circular domed chapel commemorates the traditional site of the martyrdom of S. Peter, visible in the crypt below (remodelled 1628) through a hole in the floor. A stern Doric colonnade with a consciously correct Doric entablature encircles the exterior, which resembles a Roman peripteral temple, although the projecting drum and semicircular dome befit an important Christian shrine. Restrained in ornament, wall surfaces are sculpturally treated 'all'antica' with arrangements of pilasters and shell niches. The Tempietto rapidly achieved the status of a modern classic. S. Pietro in Montorio itself (*c.* 1490), attributed to Baccio Pontelli, is an important aisleless church with an extended east end.

The **Cortile del Belvedere, Vatican, Rome** (begun 1505, much altered by subsequent architects), was designed by Bramante for Pope Julius II. It is a gigantic enclosure over 300 m (1000 ft) in length connecting the fifteenth-century papal palace with the Belvedere of Innocent VIII (1485–7) and Julius II's sculpture court, to which it ascends in three terraces now sadly partitioned into separate courtyards. From the large lower terrace (where semicircular steps were later placed to provide seating for spectators) the upper terraces and gardens were approached by a broad flight of steps and by zigzag ramps flanking a nymphaeum. At the far end a semicircular exedra was once reached by an ingenious concave and convex staircase. This was the culmination of a view from the papal apartments reminiscent of such Roman complexes as the Sanctuary of Fortuna, Palestrina. The covered walkways flanking the Cortile (today the Vatican Museums), decrease from three storeys to one at the far end (later increased under Pirro Ligorio, 1561–), thereby producing a constant roofline. The brick and stucco facades were variously articulated: the triumphal-arch rhythm of the upper court, recalling the Cancelleria, was to be enormously influential, while in the lower court the pilasters ascend from Doric to Corinthian for the first time since antiquity. Columns follow the same sequence in Bramante's spiral staircase, built for direct access to the sculpture court.

Bramante's revolutionary **Palazzo Caprini, Rome** (1501–2), had the most influential palace facade of the sixteenth century, although it had disappeared by 1600. Above an arcaded rusticated basement housing shops, paired Doric half-columns flank the pedimented windows of the piano nobile, which has a full Doric frieze. A cluster of three half-columns provides an elegant solution to the corner, particularly prominent in the street leading up to the Vatican palace. The expressive differentiation between rusticated base and Classically 'ordered' first floor was to be adopted in domestic architecture all over Europe.

Tom's September [illegible] 2001

S. Peter's, Rome (begun 1506, consecrated 1626) (pp.868C, 870, 871, 902C, 905), the largest and most important building of the Renaissance, owes the nucleus of its design to Bramante, although many other architects were to work on it. It was Julius II's whim to install a colossal tomb for himself in the choir (begun by Nicholas V, *c.* 1450) that precipitated the decision to rebuild the ancient basilica completely. Bramante made several variant designs for the new building, but all envisaged that directly above the tomb of S. Peter would rise an enormous dome of roughly the same size as the Pantheon's, supported upon four massive crossing piers. The so-called 'Parchment Plan' (Uffizi, Florence) and the foundation medal of 1506 show a Greek-cross plan within a square, with four subsidiary domes, towers at the corners, and half-domes terminating each of the four arms. Such a design is the realisation of the theoretical preference for centralised planning, but also derives from such esteemed funerary churches as S. Mark's, Venice, as well as ancient mausolea. Despite its size, however, the Greek-cross plan would not have covered the site of the old basilica, nor would it have suited congregational or processional needs: ultimately a Latin cross with an extended eastern arm was preferred (p.871G).

Bramante's building would have had a relatively severe exterior, depending for its effect on the hierarchical massing of geometric forms (rather like his earlier project for Pavia Cathedral). The dome, known both from the medal and from a woodcut in Serlio's treatise, was to be a single-shelled hemisphere, presumably made of concrete and with a stepped profile derived from the Pantheon; it would have been raised up on a colonnaded drum and surmounted by a lantern (p.870B). For the interior of the building Bramante intended to use paired Corinthian pilasters supported on tall pedestals (the floor level was later raised by Sangallo). His highly original and influential chamfered crossing piers, although later much enlarged, still survive in the completed building, enabling the nave and transepts to widen at the crossing and giving a smooth transition between pier and pendentive. In general, Bramante's sculptural approach to piers and wall mass, inspired by Roman architecture, represents a new spatial conception of great importance.

After the death of Julius (1513), Leo X appointed Fra Giocondo and the ageing Giuliano da Sangallo as co-architects, but on Bramante's own demise (1514) it was Raphael who became architect-in-chief.

At this period numerous proposals were made for the continuation of the building. Raphael's own design was a Latin cross retaining many of Bramante's ideas including the dome, although the crossing piers were enlarged. Raphael proposed the addition of ambulatories around the ends of the three short arms of the cross, and intended the building to have a monumental porticoed facade, with a giant order interlocking with smaller orders, between elaborate towers. At Raphael's death (1520), Antonio da Sangallo the Younger was elevated to architect-in-chief, assisted by Peruzzi. Peruzzi proposed many designs, including a return to the Greek-cross idea, but Sangallo's final model, commissioned in 1539, is essentially a revision and expansion of Raphael's design. The Sangallo scheme (p.870D,G) has been much abused following Michelangelo's condemnation of its 'German' qualities and lack of light. The apparent lack of unity in the model would have been offset in execution by the very scale of the building, complemented by the massing of so many parts. The western region of the model (liturgical east end) is a Greek cross with three ambulatories, but the plan becomes a Latin cross by the addition of a subsidiary domed link connecting with the facade block. Between the towers the close-packed articulation of the two-storey facade projects at the main portal with an unprecedented plasticity.

When Michelangelo was appointed as Sangallo's successor in 1546 he embarked on a radically new project involving the demolition of the Raphael/Sangallo southern ambulatory. By Michelangelo's death (1564), his project was all but realised, and his designs for the dome were essentially followed afterwards. Michelangelo's S. Peter's, claimed to be a restoration of Bramante's, is in fact a reduced and simplified Greek cross (p.870F) ingeniously formed from the nucleus inherited from Sangallo. The abolition of the ambulatories created a much better lit and more unified interior at greatly reduced cost. The external walls are articulated with rhythmically spaced giant Corinthian pilasters, laid over unmoulded vertical strips. By splaying the re-entrant angles the pilaster wall skirts the building like a giant curtain. Above an attic, concealing much of the vaulting, rises Michelangelo's majestic dome (built by Giacomo della Porta, 1588–91), which has a drum buttressed by paired attached columns, continuing up into external ribs on the dome surface, and further paired columns in the lantern. The pointed profile of the dome (although rather steeper than Michelangelo intended) recalls Florence Cathedral, as does its double-shelled method of brick construction. This allows the outer shell to rise much higher than the inner, forming with the four subsidiary domes a pyramidal composition the unity of which is enhanced by the verticality of all the external articulation. With its crown-like lantern the building rises to 137.5 m (451 ft). Thus, despite the reduction in scale, Michelangelo's building is still enormous—the dome is 42 m (138 ft) in diameter, only 1.5 m less than the Pantheon.

Michelangelo's design was continued by Vignola (appointed 1564), Ligorio (1565), Giacomo della Porta (1572) and Domenico Fontana (1585). Carlo Maderno lengthened the nave, converting the church into a Latin cross (building length 194 m, 636 ft) (p.871G) and designing his own facade (1606–12), which, although continuing Michelangelo's giant order, looks back to the designs of Raphael and Sangallo. Maderno's extension unavoidably conceals much of Michelangelo's dome even from Bernini's piazza (q.v.).

The sumptuous internal decoration was largely carried out in the seventeenth century under Bernini, who succeeded Maderno as architect-in-chief in 1629. Also by Bernini is the famous bronze baldacchino (1624–33) over S. Peter's tomb, and the spectacular Cathedra Petri (1656–65), filling the western apse and housing the supposed throne of the apostle.

S. Maria della Consolazione, Todi (1508–1607) (p.894), begun under the supervision of Cola da Caprarola, is a pilgrimage church of unclear authorship; it seems to be related to Bramante's S. Peter's, begun two years before, and also recalls Leonardo's 'ideal' church designs. The geometrically composed centrally-planned building is perhaps the most perfect and uncompromising example of its theoretically desirable type. A square crossing surmounted by a dome is abutted by four semi-domed apses, the one containing the altar being semicircular, the other three polygonal. The interior unusually combines double storeys of pilasters with a giant order at the crossing.

The **Madonna di S. Biagio, Montepulciano** (1518–64) (p.868B), was designed by Antonio da Sangallo the Elder (1455–1534), brother of Giuliano (q.v.). Like the Todi church, it is a pilgrimage centre just outside the town, and it also has connections with S. Peter's. Here the plan is a conventional Greek cross, a domed crossing and barrel-vaulted arms, but with an extension at the rear (to provide a sacristy), and a pair of towers at either side of the front facade (of which only one was completed). The mostly stone interior is much more sculptural, employing Doric half-columns and projecting pilasters, and with arched alcoves housing subsidiary altars.

Piazza S. Annunziata, Florence, was continued by Antonio da Sangallo the Elder and Baccio d'Agnolo, with the construction of a second loggia (begun 1517) facing Brunelleschi's Ospedale degli Innocenti and replicating its forms almost exactly. This established a bilaterally symmetrical piazza around the axis from the Via dei Servi to the entrance of S. Annunziata, which was given a similar loggia in the early seventeenth century.

Raphael (Raffaello Sanzio) (1483–1520) came as a young painter to Rome in 1508 to work for Julius II. In 1514 Leo X appointed him architect-in-chief of S. Peter's and thereafter he supervised most of the major architectural enterprises in Rome. As suggested in his important letter to Leo X (1519), Raphael sought to revive the sumptuousness of Roman architecture, lavish interior decoration inspired by such monuments as the Golden House of Nero being for him an essential aspect of design. He was commissioned to make a survey of ancient Rome and was at the forefront of a more far-reaching and open-minded interest in antiquity, strongly reflected in his own buildings.

The **Chigi Chapel, S. Maria del Popolo, Rome** (*c.* 1513–), is a significant departure from the architecture of Bramante, although the bevelled niches of the corners are clearly inspired by the crossing piers of S. Peter's. The intention here, however, is to provide a self-enclosed space set apart from the church, with an undulating wall surface. Two pyramidal tomb monuments under blind arches occupy the side walls of the chapel, which is well lit from windows in the drum, and encrusted with polychrome decoration: statues in the niches, bronze reliefs, coloured marbles, paintings and mosaics give it a richness of effect suited to the wealth of the patron (Agostino Chigi, papal banker) and to Raphael's ambition to equal the splendour of Roman architecture. Left unfinished in the sixteenth century, the chapel was completed with some modifications by Bernini.

The **Villa Madama, Rome** (*c.* 1516–) (p.893J), although never completed, is one of the most innovative and influential works of the sixteenth century. It was designed for Cardinal Giulio de'Medici (later Clement VII) and his cousin Leo X as a papal retreat on the slopes of Monte Mario just outside the city. A large circular courtyard was to separate two wings terraced against the hillside (only half the courtyard and the rear wing were built). Behind the courtyard a semicircular 'all'antica' theatre would have cut into the hill. The rear (summer) wing gives onto a terraced garden built up over a fish pond below, while the front (winter) wing would have been approached by steps from an enclosed forecourt flanked by round towers. The terracing, not unlike Bramante's Cortile del Belvedere, was suggested to Raphael by ancient Roman villas, as were the fish pond and subterranean nymphaea below the garden. Also particularly Roman in inspiration is the vaulted three-bay loggia leading out to the garden, with its variety of vaults, its hollowed-out wall surfaces and brilliantly painted and moulded stucco decoration. The exterior of the constructed block is articulated with a giant order of Ionic pilasters, a novelty at this date.

Palazzo Branconio dell'Aquila, Rome (1518–20; destroyed), one of the most festive palace facades of the Renaissance, lay on the main thoroughfare to S. Peter's. The lowest storey, a blind arcade with Tuscan Doric half-columns, provided space for shops. The tall piano nobile had an unprecedented complexity: between tabernacle windows with alternating triangular and segmental pediments were niches for statuary, both denying and affirming continuity with the order below; above this, mezzanine windows alternated with painted stucco medallions and swags. The more restrained third storey was finally crowned with a projecting cornice and delicate roof-top balustrade.

Antonio da Sangallo the Younger (1484–1546), nephew to both Giuliano and Antonio the Elder (q.v.), is the most maligned and misunderstood architect of the sixteenth century. Born in Florence, he began his career as a carpenter making formwork for Bramante's S. Peter's, but in 1516 he was appointed assistant there to Raphael, and from 1520 until his death he was architect-in-chief. A dedicated and scrupulous archaeologist, he supervised as papal architect most of Rome's major buildings as well as the fortifications of the Papal State. His numerous works include the elegant **Palazzo Baldassini, Rome** (1516–25), the **Papal Mint (Zecca), Rome** (1525–7), and the influential **S. Spirito in Sassia, Rome** (1538–90). Much of the town of **Castro,** of which very little survives, was planned by Antonio for Pier Luigi Farnese.

Palazzo Farnese, Rome (begun 1517, redesigned 1534 and 1541, modified under Michelangelo from 1546, and completed 1589) (pp.844A,B, 874), is the most imposing Italian palace of the sixteenth century. The 56 m (185 ft) facade (1541–), occupying the longer side of a spacious piazza, is three storeys tall (recalling Florentine palaces) and thirteen bays wide. It is built of brick with strong stone quoins and has a heavily rusticated portal. Each storey has different window frames (alternating pediments for the piano nobile) placed in dense rows against the flat neutral wall surface, which enhances the sense of scale. The crowning cornice was substantially enlarged by Michelangelo (who also designed the window over the portal) and casts a heavier shadow onto the facade than that envisaged by Sangallo. Sangallo's spectacular three-aisled vestibule (*c.* 1520–), inspired for example by Roman nymphaea, with its central barrel vault supported on Doric columns, is notable for the sculptural quality of surface. The internal rooms, which are not symmetrically disposed, are arranged around the five-bay square courtyard, of three storeys, which, like the Colosseum, ascend from Doric to Ionic to Corinthian. The two sharply detailed lower storeys with their attached half-columns are Sangallo's; the lofty, almost weightless, pilastered upper storey, with its bizarre windows, is Michelangelo's. Beautiful though it is, it is not wholly in sympathy with Sangallo's design. The block at the rear was not completed until 1589.

Porta S. Spirito, Rome (1543–4, incomplete), provides access through sixteenth-century fortifications to the Vatican area. Its facade is inspired by the Arch of Constantine, but most unusually is gently concave (as is Sangallo's Zecca). The detailing of the all-stone facade is a good example of Sangallo's expertise in this field.

Baldassare Peruzzi (1481–1536) was born in Siena and trained as a painter before settling in Rome, *c.* 1505. Much of his career was spent in the shadow of Bramante and Raphael, only becoming assistant to Sangallo for S. Peter's. Following the Sack of Rome (1527), most of Peruzzi's later years were spent in Siena and northern Italy. His best buildings and his many surviving project drawings reveal an imaginative and flexible mind less inclined to dogma than many of his contemporaries. His ideas influenced Serlio's books on architecture.

The **Villa Farnesina, Rome** (1505–) (p.893H), is a very early suburban villa designed for Peruzzi's fellow Sienese Agostino Chigi. The U-shaped plan incorporates two vaulted ground floor loggias frescoed by Peruzzi, Raphael and others, one between the projecting entrance wings and the other facing towards the Tiber; upstairs the imposing salone is decorated with *trompe l'oeil* vistas through fictive columns. The four brick facades, once brilliantly painted, all have two storeys of Doric pilasters framing large rectangular windows or loggia arches. The splendid terracotta frieze of the crowning entablature, incorporating the attic windows, is enlivened by candelabra, putti and festoons.

Peruzzi's **Palazzo Massimi 'alle Colonne', Rome** (1532–) (p.875), is a most ingenious and innovative variant of the High Renaissance palace. The planning of a difficult site is remarkably economical, with interrelated symmetrical parts rather than overall symmetry. The daringly convex exterior follows the curve of the street and uses space from the adjoining palace to extend the facade to the left, thereby allowing an axial approach from a street opposite. The paired Doric columns of the central vestibule develop as pilasters at either side, the central intercolumnation being perceptibly the widest. Above, piercing an expanse of smoothly rusticated astylar wall, the trabeated windows of the piano nobile are followed by two differing storeys of smaller but elegant attic windows. The deliberate varying of the facades of the courtyard recalls Raphael's lost Palazzo Branconio dell'Aquila (q.v.).

Northern Italy, 1520–1600

Giulio Romano (*c.* 1499–1546) began his career in Raphael's workshop and became his leading assistant. Following Raphael's death (1520), Giulio worked as both painter and architect in Rome before being invited in 1524 to become court artist to the Gonzagas in Mantua, where he remained in charge of all artistic production until his death. His buildings there are constructed of local materials, especially brick and stucco, but have a grandeur rivalling contemporary Rome, and an inventiveness bordering on quirkiness. Many of his buildings have fared badly in restoration or have vanished altogether, but **Mantua Cathedral** (1545–7) and the nearby abbey church of **S. Benedetto Po** (1539–) are excellent surviving examples, as is his own stucco-fronted **house in Mantua** (1538–46) (p.877A) with its bizarre gabled portal breaking into the rusticated arched piano nobile above.

The **Palazzo del Te, Mantua** (1525–), is Giulio's surviving masterpiece. Located just outside the city walls on what was originally an island, it formed a villa retreat for the Gonzaga duke and was constructed in distinct phases. Four one-storey wings are arranged around a large open court. The rusticated northern wing, which faces the city, incorporates an earlier structure; this partially accounts for the unusual spacing of the apertures and of the Doric pilaster articulation which has an increased rhythm at each end of the facade. The fantastic four-columned atrium of the western block is based on the Palazzo Farnese vestibule, but has curious Doric columns encased in stucco 'rustication'. The courtyard facades are even more sculptural but even less conventional than the exterior, broken pediments combining with voussoirs over the windows. Some triglyphs in the east and west facades appear to have 'dropped' from their accustomed positions in the frieze. The exterior facade of the eastern wing, the last to be built, plays variations on the Serliana motif, with complex groupings of pilasters, columns and arches, culminating in a central three-arched loggia. In front of this facade is a moat-like fish pond crossed by a bridge leading into a long enclosed ornamental garden. The sumptuous exterior architecture (originally painted) is complemented by spectacular decorations inside by Giulio's workshop.

The **Villa Imperiale, Pesaro** (1530–), is one of the many magnificent villas of this period. Built by the painter-architect Girolamo Genga (1476–1551) for the exiled Duke of Urbino, Francesco Maria della Rovere, it incorporates a fifteenth-century residential area to which is attached a series of courts and terraced gardens inspired by Raphael's Villa Madama. The monumental brick forecourt facade is closely modelled on the ruins of the Basilica of Maxentius, while the imposing courtyard behind with its seemingly many-layered surface has a tall Ionic pilaster order with a continuously varying rhythm.

Giovanni Maria Falconetto (1468–1535) came to architecture late in life, often working in collaboration with his friend and patron Alvise Cornaro. Born in Verona, he studied the antiquities there and in Rome, and was one of the pioneers of a more Classicising style in the Veneto.

The **Loggia and Odeo Cornaro, Padua,** were designed for the garden of Alvise Cornaro's palace. The Loggia (1524–), a work of striking Classicism, formed the backdrop for theatrical performances. Above a Doric arcade, Ionic pilasters frame windows with alternating pediments, recalling recent buildings in Rome. The Odeo (*c.* 1553–), a pavilion, has a central octagonal vaulted sala reminiscent of ancient Roman halls, while the general arrangement of the rooms seems closely related to a building then thought to be the villa of Varro.

The **Villa dei Vescovi, Luvigliano, near Padua** (1530s), designed for the bishops of Padua, is a square one-storey building on a dramatic hill-top site. The two arcaded facades with their delicate Doric pilaster order are approached by zig-zag staircases (inspired by the Cortile del Belvedere) which ascend heavily rusticated platformed substructures.

Jacopo Sansovino (1486–1570), born in Florence, worked as a sculptor there and in Rome where he won the architectural competition for S. Giovanni dei Fiorentini. In 1527, following the Sack of Rome, he moved to Venice where he effectively became official architect to the city. Sansovino was largely responsible for introducing High Renaissance architecture to Venice; though greatly influenced by his contemporaries, his best buildings are as inventive as they are beautiful.

The **Library of S. Mark's, Venice** (1537–) (p.878), the city's most magnificent Classical building, was begun as accommodation for Venetian officials but almost immediately designated the Library. A white stone facade of three bays overlooks the lagoon (completed by Scamozzi, 1583–8), while a twenty-one-bay facade runs along the Piazzetta, facing the Doge's Palace, embellishing the appearance of this important ceremonial space. A full Doric order of half-columns is applied to the ground floor arcade; here Sansovino allowed for the half metope at the corners advised by Vitruvius by pairing the final half-column with a pilaster overlaying a pier. The Ionic order above frames round-arched windows springing from free-standing Ionic colonnettes, a kind of compressed Serlian motif. In the spandrels are carved

omposite columns. The attic is crowned
riated pediment characteristic of the late
The flamboyant curvilinear approach to
the surface decoration which typified the
of the century have been replaced by a
at looks back to French architecture.

azzo Serbelloni, Milan (1780–94), by
toni, is more impressive than his **Palazzo**
noa. In the former, a long fifteen-bay
a pedimented three-bay central section.
ated not by projections but by recession
plane, necessitating full columns to sup-
ablature. Thus the column is conceived
nament but as a functional support. The
th in this shallow space is intensified by
of a balustrade, and by the continuous
g behind the order. The lunette window
nent is inventively treated as a balus-
a.

Pollack (1751–1806), a Viennese archi-
worked under Piermarini, designed the
elgioioso, Milan (1790–3). French influ-
detected in the plan: the courtyard is
ugh a screen wall and two low wings
de logis. Apart from the Doric entrance
ontispiece the courtyard is astylar, in
st to the elaborate garden facade.

ghteenth and early nineteenth centuries
ion of many city gateways in Milan. The
e, Milan (1801–14), designed by Luigi
2–1833), has the appearance more of a
an a gate. Isolated from its attendant
s it is a symbolic rather than functional
delled on the Roman Portico of Octavia;
ted temple fronts are set back to back
set into the sides. Other impressive
s of this period include Rodolfo Vanti-
ezia (1827–33), Giuseppe Zanoia's **Por-**
Giacomo Moraglia's **Porta Carnasina**.

Orto Botanico, Palermo (1789–92), is
eon Dufourny (1754–1818), a French
ing at the Sicilian court. His studies
eologist Le Roy are strongly reflected
The cuboid block has a Doric order
erately archaic in its detail. The ex-
sis of the Doric shafts, the heavy en-
he encircling steps are all characteris-
nple architecture of ancient Magna
ially Paestum (q.v.).

a Cinese, Villa della Favorita, Paler-
), sometimes ascribed to Giuseppe
sometimes to Giuseppe Patricola, was
r orientalism to that which created the
lion (q.v.). A light airy effect is
gh the use of a supporting skeletal
desire to remove the wall surface is
rent in the open minaret-like stair-
d eaves of the portico mimicked by
re Chinese in inspiration, but Islamic
and Pompeian art forms also make their appearance. Such delight in combining varieties of exoticism can also be found in G. D. Tiepolo's frescos in the Villa Valmarana ai Nani, near Vicenza.

The work of Giuseppe Valadier (1762–1839) reflects a familiarity with current trends in French architecture. His **Arch on the Ponte Milvio, Rome** (1805), was the successor to both antique and Renaissance arches on the same site. Valadier abandoned the time-honoured triumphal arch for a design with a more military character. Any reference to the orders has been omitted in the two superimposed cuboid blocks. Fortification is implied by the battering of the basement and the use of flat banded rustication. The massive voussoirs of the arch break forward from the receding wall plane, lending a sense of weight to the structure.

In less sombre vein is Valadier's redevelopment of the **Giardino del Pincio, Rome** (1806–14). An impressive three-bay loggia housing an equestrian monument was set against the vertical terrace wall. Above he created a casino enjoying wonderful views towards S. Peter's. A semicircular Ionic portico decorates the entrance to the building and the Ionic character is continued at the sides, where free-standing columns frivolously bear urns.

The most famous work by Giuseppe Japelli (1783–1852) is the **Caffè Pedrocchi, Padua** (1816–42) (p. 1104A). This widely travelled and knowledgeable architect created one of the most splendid examples of this new building type. Run as a gentleman's club, it included dining and billiard rooms as well as libraries and a ballroom. The facade has two projecting Doric porches which frame a huge recessed Corinthian loggia on the first storey. Elements from both Greek and Roman Revivals are evident: a Roman-inspired frieze appears above baseless Greek Doric columns in the porches. (See Chapter 31.)

The **Tempio Canova, Possagno** (1819–33), was designed in collaboration by Giovanni Antonio Selva (1753–1819) and the great neo-Classical sculptor Antonio Canova (1757–1822). The building dominates Canova's birthplace and houses his tomb. It was inspired by the Pantheon, one of the architectural preoccupations of the age; but as in other contemporary derivatives, such as the cemetery temples of Brescia and Verona, the model has been Hellenised. The Corinthian order of the original is replaced by Greek Doric, and the surface decoration has been minimised so as not to obscure the fundamental geometric forms.

The impressive **Cisternone, Livorno** (1829–42), designed by Pasquale Poccianti (1774–1858), has a facade reminiscent of the drawings of Etienne Boullée (q.v.). The wall is unadorned except for the window openings, some appropriately thermal, while the centre is marked by a severely Doric portico and crowned by a vast niche resembling a cross-section of the Pantheon.

Bibliography

ACKERMAN, J. S. *The Architecture of Michelangelo*. London, 1961. New ed. London, 1986.
—. *Palladio*. Harmondsworth, 1966.
ACTON, H. *Tuscan Villas*. London, 1973.
BARBIERI, F. *Vincenzo Scamozzi*. Vicenza, 1952.
BASSI, E. *Palazzi di Venezia*. 2nd ed. Venice, 1978.
BATTISTI, E. *Brunelleschi*. London, 1981.
BLUNT, A. *Borromini*. Harmondsworth, 1979.
—. *A Guide to Baroque Rome*. London, 1982.
—. *Neapolitan Baroque and Rococo Architecture*. London, 1975.
—. *Sicilian Baroque*. London, 1968.
BORSI, F. *Alberti*. London, 1978.
BRIZIO, A. M. *L'Architettura Barocca in Piemonte*. Turin, 1953.
BRUSCHI, A. *Bramante*. London, 1977.
BURCKHARDT, J. *The Architecture of the Italian Renaissance*. English trans. by J. Palmes, ed. P. Murray. London, 1985.
BURNS, H. *Andrea Palladio 1508–1580. The Portico and the Farmyard*. Exhibition catalogue, Arts Council of Great Britain, London, 1975.
CEVESE, R. *Ville della Provincia di Vicenza*. 2 vols. Milan, 1971.
COFFIN, D. *The Villa in the Life of Renaissance Rome*. Princeton, 1979.
CONNORS, J. *Borromini and the Roman Oratory*. Cambridge, Mass., and London, 1980.
DONATI, C. *Carlo Maderno*. Lugano, 1957.
FOSSI, M. *Bartolomeo Ammannati*. Naples, 1967.
FRANCK, C. L. *The Villas of Frascati: 1550–1750*. London, 1966.
FROMMEL, C. L. *Der römische Palastbau der Hochrenaissance*. Tübingen, 1973.
FROMMEL, C. L., RAY, S. and TAFURI, M. *Raffaello architetto*. Rome, 1984.
GAZZOLA, P. *Michele Sanmicheli*. Exhibition catalogue. Venice, 1960.
GIOVANNONI, G. *Antonio da Sangallo il Giovane*. 2 vols. Rome, 1959.
GOLDTHWAITE, R. *The Building of Renaissance Florence*. Baltimore, 1980.
HEYDENREICH, L. H. and LOTZ, W. *Architecture in Italy 1400–1600*. Harmondsworth, 1974.
HIBBARD, H. *Bernini*. London, 1965.
—. *Carlo Maderno and Roman Architecture, 1580–1630*. London, 1971.
—. *Palazzo Borghese*. Rome, 1962.
HOWARD, D. *The Architectural History of Venice*. London, 1980.
LETAROUILLY, P. M. *Student's Letarouilly illustrating the Renaissance in Rome*. London, 1948.
LIEBERMAN, R. *Renaissance Architecture in Venice*. London, 1982.
LOTZ, W. *Studies in Italian Renaissance Architecture*. Cambridge, Mass., 1977.
MACANDREW, J. *Venetian Architecture of the Early Renaissance*. Cambridge, Mass., 1980.
MANETTI, A. *Life of Brunelleschi*. English trans. by C. Enggass, ed. H. Saalman. University Park, Pennsylvania, and London, 1970.
MASSON, G. *Italian Gardens*. London, 1961.
—. *Italian Villas and Palaces*. London, 1966.
MURRAY, P. *The Architecture of the Italian Renaissance*. Rev. ed. London, 1986.
NOEHLES, K. *La Chiesa di SS. Martino e Luca nell'opera di Pietro da Cortona*. Rome, 1970.
POLEGGI, E. *Strada Nuova*. Genoa, 1968.
POMMER, R. *Eighteenth-century Architecture in Piedmont*. New York, 1967.
PORTOGHESI, P. *Borromini*. London, 1968.
—. *Guarino Guarini*. Milan, 1956.
—. *Roma barocca*. 2nd ed. Rome, 1973.
PUPPI, L. *Michele Sanmicheli*. Padua, 1971.
—. *Andrea Palladio*. London, 1975.
ROVERE, L., VITALE, V. and BRICKMANN, A. E. *Filippo Juvarra*. Milan, 1957.
SAALMAN, H. *The Cupola of S. Maria del Fiore*. London, 1980.
SHEPHERD, J. C. and JELLICOE, G. A. *Italian Gardens of the Renaissance*. London, 1976.
SEMENZATO, C. *L'Architettura di Baldassare Longhena*. Padua, 1954.
TAFURI, M. *Sansovino*. Padua, 1969.
WALCHER CASOTTI, M. *Il Vignola*. 2 vols. Trieste, 1960.
WITTKOWER, R. *Architectural Principles in the Age of Humanism*. 4th ed. London, 1973.
—. *Art and Architecture in Italy, 1600–1750*. Rev. ed. Harmondsworth, 1973.
—. *Studies in the Italian Baroque*. London, 1975.
WÖLFFLIN, H. *Renaissance und Barock*. English trans. London, 1964.

victories above and sea-gods below. The rich broad frieze is pierced with oval windows, and the crowning balustrade topped by statues and obelisks. Sansovino's Library was part of a more comprehensive scheme to rebuild the south side of Piazza S. Marco, continued by Scamozzi with the Procuratie Nuove (1586–). The realignment of the Piazza established by the Library had the important effect of opening up the view of S. Mark's, creating a spectacular and more balanced effect.

The **Zecca (Mint), Venice** (1536–), has a severe appearance in keeping with its function. Above the rusticated basement are banded Doric half-columns, the windows between having heavy projecting entablatures supported on corbel blocks. The facade abuts the contrasting lagoon elevation of the Library, although the various cornices do not align. The late addition of a third storey (*c.* 1560) did not enhance Sansovino's design.

The **Loggetta, Venice** (1537–) (p.845H), positioned at the base of the Campanile opposite the main entrance to the Doge's Palace, was intended as a meeting place for nobles. The facade is a triple triumphal arch, with free-standing Composite columns, inspired by the Arch of Severus. Polychrome facing marbles, statuary in the niches, and relief sculpture in attic and spandrels, make this little building the most ornate and festive in Venice.

Palazzo Cornaro, Venice (1545–) (p.845F), is one of the most imposing palaces on the Grand Canal. Above a high rusticated basement are two living floors with paired Ionic and Corinthian half-columns. The tight grouping of the three central bays marking the salone follows Venetian tradition in creating a tripartite facade. The arrangement is emphasised by the severe three-arched portal below. Flanking this are bizarre windows with banded Doric columns and squashed pediments, while elongated Michelangelesque volutes frame the mezzanine openings above. The strongly sculptural effect is enhanced by trophies in the spandrels.

Michele Sanmicheli (1484–1559), a native of Verona, went as a young stonemason to Rome where he came into contact with the circle of Bramante. From 1509 to the early 1520s he was chief architect of Orvieto Cathedral, and in 1526 inspected the fortifications of the Papal States with Sangallo the Younger. Moving back to the Veneto, he became architect-in-chief of Venice's defences from before 1530 until his death, but most of his non-military works were for the local aristocracy in his native Verona. He excelled in particular in the masterly detailing of stone facades.

Palazzo Bevilacqua, Verona (*c.* 1530) (p.880J), has a seven-bay stone facade intended to be continued to one side. Alternating bay widths and a great variety of detail create an exceedingly complex rhythm. The major bays of the piano nobile are defined by Corinthian half-columns with alternately vertical and spiral fluting; river gods and victories adorn the spandrels, and segmental and triangular pediments alternate over the windows of the minor bays. The long balcony separating the storeys is carried on volutes which replace the triglyphs of the Doric order below, where emperor-bust keystones and lion window-ledge supports enliven the severity of the rustication.

Palazzo Pompei, Verona (*c.* 1550) (p.880A–C), inspired by Bramante's Palazzo Caprini, has an order of fluted Doric half-columns over a rusticated basement. There are a number of subtleties: the widened central bay, the additional pilasters at the corners giving added visual strength, and the simplification of the rusticated supports and sill of the windows below.

Palazzo Grimani, Venice (*c.* 1556–) (p.879), is the most magnificent palace on the Grand Canal. Although the use of Corinthian columns over pilasters and the pairing of the order in the side bays recall the Palazzo Vendramin-Calergi (q.v.), the Palazzo Grimani facade is even more grid-like in character with strongly emphatic horizontal cornices. The three storeys diminish in height, and the Venetian grouping of the bays allows great variety within the unified structural grid. The tripartite columnar vestibule is based on the Palazzo Farnese, Rome (q.v.).

Porta Palio, Verona (*c.* 1545–) (p.877B), is one of Sanmicheli's three gates for the city. The external three-bay facade is Doric, using paired half-columns with pilasters at the corners. The stonework design is here very elaborate, especially the patterning of the rustication and the huge projecting keystones. The three entrances are set back into rectangular recesses, very likely the outcome of Sanmicheli's study of the Roman theatre in Verona, while rusticated Doric is both appropriate to a fortified gateway and also characteristic of Roman monuments in the city.

The **Madonna di Campagna, Verona** (1559–), a pilgrimage church a little way outside the mediaeval city, is one of the most ambitious centrally planned churches of the sixteenth century. It comprises an enormous domed rotunda with a smaller domed space housing the altar behind. A peripteral Tuscan-Doric colonnade runs around the rotunda exterior, while the octagonal interior has two Composite stories.

Sanmicheli's other influential religious building is the **Cappella Pellegrini, S. Bernardino, Verona** (*c.* 1527–), with its beautiful two-storey interior inspired by the Pantheon and Raphael's Chigi Chapel. The rhythmic complexity of the articulation and delicate extravagance of the ornamental detailing relate the Chapel to the Palazzo Bevilacqua.

The very large **Palazzo della Gran Guardia, Verona** (1610–14, completed 1819–53) (p.880D–F), by Sanmicheli's pupil Domenico Curtoni, is the best example of subsequent Sanmichelian style in Verona which persisted until the nineteenth century.

Andrea Palladio (1508–80) is perhaps the most celebrated architect of the Renaissance. Born in

Padua of humble parentage, he trained as a stonemason, moving to Vicenza in 1524. Here, encouraged by the intellectual Gian Giorgio Trissino, and making frequent visits to Rome to study the ancient monuments, he learned the profession of architecture. His first works are mainly palaces and villas for Vicentine patrons, but from *c.* 1555 he worked increasingly for Venetians. His penetrating studies of ancient buildings and his systematic approach to design led to a Classical style of great adaptability yet sympathetic with local materials and traditions, capable of providing grandeur on a limited budget. His enormous influence derives largely from his exemplary publication of his own designs in the *Quattro Libri* (1570), which became a handbook of good design.

In 1549, Palladio's scheme to replace the Gothic arcades of the council chamber, now known as the **[illegible]silica, Vicenza** (p.883), was accepted in preference to designs by other notable architects. The new stone facades run around three sides of the building (four in the *Quattro Libri* plan) and are of two storeys, Doric below and Ionic above. Serliana openings (the so-called Palladian motif) are framed by half-columns which are doubled at the corner. This brilliantly flexible solution allows for site constrictions and irregular bay widths due to the Gothic core behind, since the side openings of the Serliana can be expanded or contracted at will. A balustrade punctuated by sculpture crowns this soberly magnificent structure.

The **Palazzo Thiene, Vicenza** (1542–) (p.885A), is an early palace in a rusticated idiom very much indebted to Giulio Romano. Above a rusticated brick basement, the Corinthian pilasters of the piano nobile, paired in the corner bays, frame window tabernacles with alternating triangular and segmental pediments supported by Ionic colonnettes encased in a series of blocks. Deriving from the lost house of Giulio Romano in Rome, these were to have a long history in English Palladian architecture.

The **Palazzo Chiericati, Vicenza** (1551–), responds to its awkward shallow and broad site with a highly unusual solution. Of its eleven-bay facade (only the left four bays executed by Palladio; the remainder completed in the late seventeenth century) all but the central five bays of the piano nobile are open in the form of a two-storey trabeated portico, built out over the piazza. The closed bays contain the windows of the great salone.

The **Palazzo Valmarana, Vicenza** (1565–) (p.884D), is a late palace in which Palladio uses an order of giant Composite pilasters for the central five bays of the seven-bay facade. A smaller Corinthian order frames the windows of the lower storey. In the outer bays the giant order is replaced by a bizarre two-storey solution of Corinthian pilasters below and lone warriors in carved relief above, supporting the extremities of the main entablature. This highly individual facade, notable for the variety of its stucco decoration, achieves the effect of a superimposition of several layers. At the very sculptural and decorative **Palazzo Barbarano, Vicenza** (1570–5), Palladio superimposes Ionic and Corinthian half-columns. Yet another variation of the High Renaissance palace facade is the unfinished **Palazzo Porto Breganze (Casa del Diavolo), Vicenza** (1570s) (p.884G), which, with its giant Composite half-columns, would if completed have been seven bays wide.

The **Loggia del Capitaniato, Vicenza** (1571–2), a meeting place in front of the residence of one of the main Venetian officials, has a three-bay facade on the piazza with a giant order of Composite half-columns. The tall windows of the assembly room above the arched loggia break through the architrave, and are supported below by strange Michelangelesque blocks.

The **Teatro Olimpico, Vicenza** (1580–) (p.889A), was the first permanent theatre to be built since antiquity. Inspired by ancient theatres, the seating area is actually half an oval so as to fit into an earlier structure, while the elaborate (wooden) background to the stage resembles the 'scenae frons'. The perspective vistas behind, with their street facades of diminishing scale, were added by Scamozzi (1584–5).

Villa Poiana, Poiana Maggiore (*c.* 1549), is typical of Palladio's early villa farmhouses, other good examples being **Villa Pisani, Bagnolo** (1541–4), and **Villa Saraceno, Finale di Agugliaro** (finished 1545). All have two apartments of three differently-sized rooms flanking a loggia and rectangular salone, a plan which remained Palladio's preferred scheme for villas. The components of Villa Poiana's single-storey facades are unusually simplified, especially the Serliana entrance. The attic above, a produce store, is gabled over the entrance to form a pediment.

The **Rotonda (Villa Almerico-Capra), near Vicenza** (finished by 1569) (p.884A–C), was not a villa-farm but a palatial retreat from the city. The round form of the central domed salone gives the villa its name. Like most of Palladio's later villas, it uses the pedimented temple-front motif, but this building is distinguished by its centralised square plan with four identical projecting porticoes overlooking spectacular views. This unusual design was especially popular in eighteenth-century England (see Chapter 29).

The **Villa Barbaro, Maser** (mid-1550s), unites the country house with farm buildings to form a monumental composition of great influence. The linking barns terminate emphatically with pedimented dovecotes. The attached temple-front facade occupying the full width of the main block is an interesting alternative to Palladio's more usual format. **Villa Pisani, Montagnana** (1552), and **Villa Cornaro, Piombino Dese** (1552–3), with their two-storey attached porticoes, provide further variants, while the **Villa Foscari, Malcontenta** (before 1560), has an additional gabled attic. Among Palladio's most ambitious designs is the unexecuted **Villa Mocenigo, on the Brenta** (designed before 1570) (p.884E,F), where four curved colonnaded wings radiate from a pedimented block with central courtyard. The simpler **Villa Badoer, Fratta Polesine** (1556), provides a built example with curved wings.

S. Giorgio Maggiore, Venice (1565–) (pp.885C, 886A–E), has a Latin-cross plan, with a short nave and domed crossing. As a major Benedictine church it caters for monastic requirements, having side aisles, deep apsidal transepts, and a retrochoir (common in sixteenth-century Venice). Grouped Corinthian pilasters articulate the aisles, and the nave is lined with giant Composite half-columns on pedestals grouped with pilasters at the crossing. The white stone and plaster interior, well lit at clerestory level by huge thermae windows in the vault, has the pristine clarity thought appropriate by Palladio for churches. The facade treatment is a departure from earlier two-storey arrangements. Here the giant Composite half-columns and Corinthian pilasters reflect the internal disposition. The four half-columns of the central section are raised on high bases, and crowned by a temple-front pediment; the smaller order effectively continues the whole width of the facade, carrying half-pediments at each side.

The **Church of the Redentore, Venice** (1577–) (p.886F–J), Palladio's finest church, was built by the Venetian government to mark the end of a severe plague. The single-naved plan has a tri-lobed crossing, a curved columnar screen behind the altar leading to the simple monks' choir. Interconnected side chapels flank the vaulted nave lit by thermae windows. As at nearby S. Giorgio, the facade is composed of major and minor orders, rising this time from the same level. Seen from across the water, the dome, turrets and projecting buttresses unite with the facade to form a complex but strongly unified composition.

The **Rocca Pisani, Lonigo** (1576), is the name given to a gem-like villa designed by Vincenzo Scamozzi (1552–1616). Scamozzi was Palladio's principal follower and published a very influential treatise, his *Idea* (1615). The villa, which stands alone on a large hill, is a compact single-porticoed version of Palladio's Rotonda with an octagonal rather than circular salone. Relatively small windows are brilliantly placed within expansive white walls, giving a serene geometric effect.

Galeazzo Alessi (1512–72), born of a noble family and trained in Rome, first worked in his native Perugia before moving to Genoa (1548) and then Milan (1557). Much indebted to his contemporaries, his numerous works are nevertheless very individual. In particular he had a deep feeling for unorthodox 'all'antica' detailing and stucco decoration. Several of his domestic buildings in Genoa embody novel variations of level, exploiting the difficult topography of the hilly city.

S. Maria di Carignano, Genoa (1549–72; completed 1603) (p.885B), built on the summit of a hill, has a plan which closely follows Bramante's S. Peter's: a Greek cross within a square with a central dome and four smaller domes on the diagonals. The somewhat squat pedimented facade is flanked by two corner towers (a matching pair was intended) rising from the cornice of the pilaster order. The plainness of the exterior walls contrasts with often very elaborate architectural elements, in particular the small rectangular windows.

Villa Cambiaso, Genoa (1548–), on high ground above the city, has a simple nearly-square plan not unlike a Palladian villa but with a hall at the centre of the building behind the entrance loggia. The facade recalls Peruzzi's Villa Farnesina, Rome (q.v.), although the sculptural handling and intricacy of the architectural members are very different. This provides a foretaste of the astonishing decoration of the upper loggia, encrusted with lavish ornament.

The **Strada Nuova, Genoa** (1550–), was almost certainly planned by Alessi to accommodate new palaces for the Genoese nobility. The palaces on the north side of the street are shelved into the steep hillside behind, Alessi's **Palazzo Cambiaso** (1558–60) on the initial corner having a typically ornamental facade. The best palace, **Palazzo Doria-Tursi**, was supervised by Alessi's associate Rocco Lurago. From a vestibule, a monumental flight of steps leads up to the imposing courtyard (on a level with the terraces on either side of the palazzo). At the rear, another staircase leads to a grotto, and further flights ascend to the upper level. A similarly ambitious series of levels appeared in Alessi's **Villa Sauli, Genoa** (*c.* 1550, little remaining).

Palazzo Marino, Milan (1558–*c.* 1570) (p.890B), was designed by Alessi for a Genoese, T. Marino, who had bought himself the title, Duke of Terranuova. The building is fittingly megalomaniac, standing on a huge island site. The main facade, three storeys high and eleven bays wide (the east side has fifteen bays), is densely decorated in a repetitive yet bizarre manner, using motifs derived from Michelangelo and Giulio Romano. The courtyard is more modestly scaled but exceptionally lavish: above the Doric Serlian elements of the lower storey, attached herms, niches and elaborate panels smother the upper arcades.

Pellegrino Tibaldi (or Pellegrini) (1527–96)—a painter-architect from Bologna—was brought by the reforming Cardinal S. Carlo Borromeo to Milan, where he succeeded Alessi as chief architect. His buildings often have a dynamic austerity, particularly the **Collegio Borromeo, Pavia** (1564–), with its powerfully effective fenestration arrangements. Very impressive also is his modernisation of the **Sanctuary at Saronno** and his round votive church of **S. Sebastiano, Milan** (1577–). The Jesuit church of **S. Fedele, Milan** (1569–, east end altered) resembles Alessi's earlier **SS. Paolo e Barnaba, Milan** (1561–7), in its compact form. The nave consists of two square

Quite commonly naves were divided from aisles by antique columns (p.313C). The choir was occasionally raised above a crypt reached by steps from the nave.

In consequence of the brilliant climate, while arcades are universal, doors and windows are small and unimportant, with 'jambs' in rectangular recesses or 'orders' filled in with small shafts, crowned with semicircular arches (p.310B,C) in contrast with the Classical architrave. Window tracery was at no time employed to any great extent in Italy, and even wheel-windows are only rudimentary in pattern. Timber roofs over naves are of the simple, open basilican type with rafters and tie-beams often effectively decorated in colour (p.317A); while aisles occasionally have groin vaults of small span, divided into compartments by transverse arches.

A vast number of columns from ancient Roman temples were used in the new churches, and this retarded the development of the novel types of column which were introduced in districts more remote from Rome (pp.313C, 317A). The finely carved and slender twisted columns in the cloisters of S. Giovanni in Laterano and S. Paolo fuori le Mura, Rome, are delicate variations of the Classical type (p.310H). There are rough imitations of old Classical mouldings, but elaborate variations of a more pronounced Romanesque type in recessed planes were used in doorways and windows (p.310B–E).

Classical precedent in ornament was followed so as to suit the old fragments incorporated in the new buildings, and rough variations of the Roman acanthus scroll are frequent (p.311D,J). The rows of Apostles on doorway lintels, as at Pistoia, are similar in style to Byzantine ivories. In all parts of Italy Christian symbolism now entered into decorative carving and mosaics. The monogram of Christ, the emblems of evangelists and saints, and the whole system of symbolism, represented by trees, birds, fishes and animals, are all worked into the decorative scheme. At Tuscania, the high altar in S. Maria Maggiore and the mosaic paving in S. Pietro (p.311C,K) are characteristic of the region and of their period. Byzantine influence was strong in Ravenna and Pisa, which developed their own individual styles. Campanili or bell-towers, which seem to have originated in the sixth century, henceforward gave a special character to ecclesiastical architecture (pp.313A, 314A–D).

Northern Italy

It was in Lombardy that the most important advances took place. The principal innovations were the development of the rib vault, the exterior wall passage and the arched corbel table. The Lombard rib vault was short-lived but exterior wall passages (no more than niches in the first instance) and arched corbel tables, introduced in simple forms during the tenth century, spread quickly to northern Spain, central Italy, Burgundy and the German Empire. Arched corbel tables are an eaves decoration consisting of corbels interconnected with arches (p.311H).

The northern Italian churches are basilican in type, but naves as well as side aisles are vaulted and have external wooden roofs. Aisles are often two storeys in height, while thick walls between the side chapels act as buttresses to resist the pressure of the vaults. The flat, severe entrance facades stretch across the whole church, thus masking externally the division of nave and aisles. There is often a central projecting porch, with columns standing on the backs of crouching beasts and a wheel window above to light the nave. The gable is characteristically outlined with arched corbel tables and there are also arcades round the apse under the eaves. The general character becomes less refined, as stone and brick are used instead of marble, and ornament shows a departure from Classical precedent. The Comacene masters, a privileged guild of architects and sculptors originating in Como, built churches with characteristic decoration during the eleventh century, not only in the north, but also in other parts of Italy.

There were many baptisteries, usually octagonal or circular, such as the one at Novara, which is connected to the Cathedral by an atrium similar to the more famous one at S. Ambrogio, Milan. Wall passages round such features as apses and octagonal lanterns give great charm to the buildings externally (p.310E,G). Towers are straight shafts, often detached, as at Verona (p.320A), without buttresses or spires (pp.310F, 316C, 317C). The composition of facades usually relies upon simple pilaster strip decoration, running from the ground and ending in arched corbel tables, as at S. Abbondio, Como (p.310F). Internally, sturdy piers faced with attached half-columns took the place of the Classical column, to provide support for the heavy stone vaulting (p.318B,D). The half-columns on the side towards the nave were carried up as vaulting shafts, and this was the beginning of a system which was destined in the Gothic period to transform the shape of piers.

As decoration there are roughly carved grotesques of men and beasts and vigorous hunting scenes and incidents of daily life. Crouching beasts supporting columns of projecting porches and interior furnishings such as bishops' thrones (p.311A) and fonts (p.311L) and corbel tables (p.311H) are typical.

Southern Italy and Sicily

The changing architectural character can be traced through Byzantine, Muslim and Norman rule, and each successive period carried with it something from bays, the domical vaults supported on free-standing columns. Beyond a domed crossing is an apse, while the transept is actually less wide than the nave. The bright interior is unadorned with paintings.

S. Maria (Madonna di Vico), Vicoforte di Mondovi (1596–), is the masterpiece of Ascanio Vitozzi (*c.* 1539–1615), an architect from Orvieto who worked around Turin. Oval in plan, it is the largest centralised building of the sixteenth century. With the miraculous image at the centre, the main entrance and high altar are on the main axis, and there are two lateral entrance vestibules, four diagonal chapels (for Ducal tombs), and four corner towers which recall Alessi's S. Maria di Carignano. The church's Ducal and votive character is underlined by the lavish stucco decoration of the interior.

Florence and Rome, 1540–1600

Michelangelo Buonarroti (1475–1564) became an architect in mid-career, although his architectonic bias is apparent in his early painted masterpiece, the Sistine Chapel ceiling (1508–12). By far the most individual of Renaissance architects, he was profoundly influential not only in the later sixteenth century but also in the Baroque period. He combined a firm sense of the visual unity of a building, often using giant orders and strong horizontal cornices to bind the design together, with a wilfully unorthodox, often bizarre approach to sculptural detail. Both qualities are seen at S. Peter's, Rome (q.v.), a fitting climax to his long architectural career.

The **New Sacristy, Florence** (1519–) (p.889A), was commissioned by Cardinal Giulio de'Medici, later Clement VII, as a second family mausoleum in the church of S. Lorenzo. In plan it mirrors Brunelleschi's Old Sacristy opposite, and the grey stone and white plaster interior is also very similar, but with the addition of an attic zone (recalling Giuliano da Sangallo's S. Spirito sacristy). In strong contrast to this sober grey *pietra serena* articulation are the bizarre tomb monuments in the centre of the side walls, made of highly polished white Carrara marble. In the corner bays are marble doors with slab-like cornices doubling as the sills for oversize niches above, their recesses capriciously breaking upwards and outwards into their crowning segmental pediments. Beneath the coffered dome, the Sacristy is illuminated by four extra windows with exaggeratedly tapering frames.

The **Laurentian Library, Florence** (1524–) (p. 890A), is located in the cloister of S. Lorenzo. The library itself is a long room with reading desks, well lit by rows of windows between pilasters which correspond to the beams of the ceiling (completed 1550s). This reposeful and clearly articulated space is preceded by a much taller monumental vestibule of square plan, almost entirely filled by an extraordinary staircase (executed by Ammanati 1559–), spilling from the library door and multiplying into three flights of stairs, of which the outer two are hardly usable. The vestibule walls are particularly unorthodox: paired columns rising from insubstantial volutes are recessed behind the white plaster wall surface from which project tabernacle niches with pilasters perversely widening towards their capitals.

The **Capitoline Palaces, Rome** (*c.* 1539–) (p.891), form the most coherently planned group of buildings of the sixteenth century and provide an appropriate setting for the traditional heart of the city. The three palaces are symmetrically disposed around a trapezoidal piazza which widens towards the **Palazzo del Senatore** (completed 1600). This palace and the **Palazzo dei Conservatori** (1561–84), on the right-hand side, were refaced, and a new building, the **Palazzo Nuovo** (Capitoline Museum) (1603–54), with a matching facade was built to complete the trio. The piazza is entered by a monumental flight of steps ascending the steep slope, and the parapet at the top is surmounted by redeployed Roman sculptures. The piazza itself is dominated by the Roman bronze equestrian statue of Marcus Aurelius (p.891C), standing on an oblong pedestal at the centre of a large oval mound. Additions have been made to the piazza following Dupérac's engraving of Michelangelo's scheme (1569), the last being the interlaced twelve-pointed paving (1946). Of the Palazzo del Senatore facade only the double-ramped staircase was built by Michelangelo, the remainder being completed by Martino Longhi with a rather disappointing stucco articulation. The Palazzo dei Conservatori, by contrast, was faced in stone with only minor modifications to Michelangelo's proposals, and is one of his most successful designs (the Palazzo Nuovo follows it almost exactly). Giant Corinthian pilasters laid over piers support a massive cornice crowned by a balustrade and punctuated with statuary. The lower storey is a trabeated loggia with daringly wide voussoir lintels supported by columns placed close to the piers. Despite the overall sense of restraint and structural order, the sculptural detailing is characteristically inventive. The larger central openings are by Giacomo della Porta.

The **Porta Pia, Rome** (1561–4, completed later with modifications), is the culmination of a new street built by Pope Pius IV and replaces a Roman gateway. Its portal is one of Michelangelo's most characteristically unorthodox inventions. Particularly notable are the angular arch, the entablature segments reminiscent of giant triglyphs, the curving form between, inspired by a thermae window, and the portions of a broken segmental pediment above, which ends in tight volutes supporting a hanging garland.

The **Cappella Sforza, S. Maria Maggiore, Rome** (1560–73), is a work almost prophetic of Borromini and the seventeenth century. The central area is marked by four detached columns centred at 45 degrees, with an altar area projecting beyond; but to either side are substantial recesses with gently curving rear walls, and in the vaults above are extraordinary tapering windows.

Michelangelo's other religious projects are just as unconventional. For **S. Maria degli Angeli, Rome** (1561–), he converted the tepidarium of the Baths of Diocletian into a church, but established the main axis about the width of the hall. His final design (1560) for **S. Giovanni dei Fiorentini, Rome** (project designs submitted by leading architects from 1518, ultimately built as a conventional Latin-cross church by Giacomo della Porta and completed by Maderno, 1620, facade by Galilei, 1734) proposed a circular domed space with eight alternating rectangular and oval vestibules and chapels.

Giorgio Vasari (1511–74), famous for his biographies of the artists, was also a prolific painter and talented architect working mostly in Florence for the Medici Duke Cosimo I, and in his native Arezzo.

The **Uffizi, Florence** (begun *c.* 1560, completed by Alfonso Parigi and Bernardo Buontalenti soon after 1580) (p.889C), was built primarily to house thirteen Florentine magistracies and guilds in one place, and forms a long U-shape between the Palazzo Vecchio and the River Arno, which the short side overlooks. Around the enclosed piazza, 140 m (459 ft) in length, are loggias with a mezzanine, one major storey and an attic above. The long loggias, with repeated pairs of columns between piers containing statue-filled niches, culminate in the narrow end elevation with its open Serlianas, forming a spectacular vista from the Piazza della Signoria. A notable feature added by Buontalenti is the renowned **Porta delle Suppliche** (after 1574) with its divided and reversed segmental pediment. The Uffizi also incorporates a section of Vasari's **Corridoio,** a covered passageway for the duke connecting the Palazzo Vecchio with the Palazzo Pitti (q.v.) across the Arno. In 1581 Buontalenti began converting the upper storey of the Uffizi into ducal galleries (hence today's museum), constructing there the famous **Tribuna** (1584–), an exceptionally opulent octagonal room which housed the core of the collection.

Bartolomeo Ammanati (1511–92) and Bernardo Buontalenti (1531–1608) were leading Florentine architects of the second half of the century. Buontalenti built several **villas** for the Medici outside Florence, notably at **Pratolino** (1569–, destroyed) and at **Artimino** (1594), which is an expanded version of Poggio a Caiano (q.v.). He was also renowned for his theatre spectaculars, and his garden designs and ornamental features such as the surviving stalactite encrusted grottoes in the **Boboli Gardens, Florence** (1583–8). Ammanati's best work in Florence is the heavily detailed rusticated rear facade of Palazzo Pitti (q.v.), but he also worked extensively in Padua, Lucca, Rome and elsewhere. Ammanati's **Collegio Romano** (1581–5), one of the earliest theological colleges to be built in Rome, is of a scale anticipating the following century. The imposing brick facade is divided into three parts, and the arrangement of windows and doors of very different sizes in varying groups creates an interesting compositional effect.

The **City Walls, Lucca** (1504–1645), the work of local architects, constitute the most substantial surviving city defences of the sixteenth century. Their low battered profile is well suited to the realities of contemporary warfare, and their multi-angular course with frequent bastions caters well for defensive cross-fire.

Giacomo Barozzi da Vignola (1507–73), born near Bologna and trained as a painter, came to prominence as one of Rome's leading architects largely through the patronage of Paul III and the Farnese family. In 1562 he published his *Regola*, a series of engraved plates on the five orders with explanatory captions; this first systematic treatment of the subject was to have a great impact, particularly in France. His built works include the imposing **Portico dei Banchi** (*c.* 1561–) along the side of the main square in **Bologna**, as well as the unfinished gargantuan **Palazzo Farnese, Piacenza**.

The **Villa Giulia, Rome** (1551–) (p.893A–G), was built for Pope Julius III just outside the city walls. Vignola's exterior two-storey facade is severe, with rusticated quoins and portal, the voussoirs characteristically overlapping the entablature. Immediately beyond, however, a semicircular courtyard loggia with large and small orders leads into a delightful enclosed garden, much of which was actually designed by Ammanati. Beyond a pavilion at the end of the first garden court, steps curl down to a lower level, from which a nymphaeum with caryatid figures can be seen still further below; here emerge the waters of the Aqua Vergine restored by Julius. The effect is to create a series of very different and surprising spaces which are essentially inward rather than outward looking.

The **Gesù, Rome** (1568–) (p.894D–H), the mother church of the Jesuits, was financed by Cardinal Alessandro Farnese and is Vignola's best-known building. The simple plan, deriving from Alberti's S. Andrea, Mantua, and Raphael's S. Peter's, has a wide aisleless barrel-vaulted nave, with chapels between paired pilasters and a domed crossing with barely projecting transepts. The well-lit interior allows an unobstructed view of the altar, now placed in the eastern arm of the church. The magnificent painted decorations date from the following century (nave, 1672–85; Andrea Pozzo's famous altar in the north transept, 1696–1700), but Vignola may not have intended the interior to be left bare. Giacomo della Porta's slightly more unified facade (1571–), which places a new emphasis on the portal, was eventually preferred to Vignola's.

S. Andrea, Via Flaminia, Rome (1550–*c.* 1553) (p.867D–J), a church of simple design, has a facade distantly inspired by the Pantheon. The rectangular interior is of interest for its oval dome carried on oval arches.

In **S. Anna dei Palafrenieri, Rome** (1565–), these ideas are developed further. Although the outer shell of the church is still rectangular, the interior is an oval with four rectangular additions to the main axes, service rooms taking up the remaining space. The facades on two adjacent sides correspond to two main altars inside, but the oval plan provides unambiguously major and minor axes. **S. Giacomo degli Incurabili** (1592–), begun by Francesco da Volterra and completed by Maderno, is another very important late sixteenth-century church in Rome with an oval interior.

The **Palazzo Farnese, Caprarola** (1559–) (p.896), which dominates this village north of Rome, is a massive palatial villa transformed by Vignola from a fortress designed by Sangallo the Younger. The pentagonal building rises in two storeys from a rusticated basement which projects as bastions at the corners, echoed above by the blank end bays of the upper storeys. The state apartments, notably the Gran Sala with its cave-like encrusted decoration, are grouped around a circular courtyard articulated with a two-storey Serlian motif. The palace is approached up the steep rise by a truly spectacular series of monumental ramps and terraces, commensurate with the huge scale of the building above.

Villa Lante, Bagnaia, near Viterbo (1566–), attributed to Vignola, is most notable for its splendidly preserved gardens. Two casinos overlook a formal parterre with a pool and central fountain reached by bridges. From between the casinos rises an axial series of steps, ramps and terraces with fountains, water chains and water-cooled dining tables. A second less formal garden (bosco) has an itinerary punctuated by fountains and sculptural ensembles.

The **Sacro Bosco, Bomarzo, near Viterbo**, is less convincingly associated with Vignola. This garden is laid out on very different principles: rocky outcrops scattered in woodland are carved into fantastic and exotic beings and creatures. The entrance to a cave takes on the form of a grotesque face, and a tower is designed as a leaning ruin. Yet at the centre of these scattered delights a tempietto with portico and dome provides a serious, even solemn culmination.

Pirro Ligorio (*c.* 1510–83) began his career as a painter before turning to architecture, briefly becoming architect to S. Peter's (1564–5). During his later life he was employed by the D'Este family in Rome, then in Ferrara. He was the most dedicated of all sixteenth-century archaeologists, and many of his illustrated notebooks survive.

The **Casino of Pius IV, Rome** (1558–61) (p.890C), actually begun for Paul IV, stands in the Vatican gardens. Two portals and two loggias (one in front of the Casino proper) are grouped around an oval enclosure reminiscent of Ligorio's reconstructions of naumachias. The extremely elaborate encrusted stucco decoration is also inspired by antiquity, especially Roman tomb interiors.

The **Villa d'Este, Tivoli** (*c.* 1565–72) (p.897A,B), has perhaps the most ambitious garden of the sixteenth century. It is laid out over a series of terraces on the hillside below the villa itself, previously a Benedictine monastery. One main axis leads down from the south-west facade, and is crossed by several subsidiary axes usually terminating with fountains or other architectural features, such as the marvellous organ fountain (p.897A) (once housing a hydraulic organ) with its orders of rusticated herms and caryatids, and the Rometta, which traces the course of the Tiber through a miniature reconstruction of ancient Rome. Yet it is the sheer quantity of water-jets, fountains, pools and channels that gives this villa its unique quality.

The **Villa Medici, Rome** (1564–) (p.897C), designed by Annibale Lippi, and continued by Ammanati (1576–), has a massive stern facade overlooking the city but an exceptionally ornate garden front modelled on the Casino of Pius IV, which incorporates pieces of antique sculpture.

Giacomo della Porta (1533–1602) was the most talented of the architects working in Rome towards the end of the sixteenth century. He completed the Gesù at Vignola's death (1573) and became chief architect at S. Peter's, constructing Michelangelo's dome (q.v.). Deeply indebted to Vignola, and especially to Michelangelo, his works have a unity of design foreshadowing the following century.

S. Andrea della Valle, Rome (begun 1591, continued by Maderno, 1608-25; facade by Rainaldi, 1655–65), the mother church of the Theatines, is inspired by the Gesù, although the nave has grouped pilasters which continue as well-defined ribs across the barrel vault, giving the expansive interior a strong cohesion.

Villa Aldobrandini, Frascati (1598–1602, completed 1604 by Maderno and G. Fontana), has a large astylar multi-storey facade standing on a high terrace. Two barely projecting wings support the sides of a colossal broken pediment, the raking angles of which align with the much smaller pediment over the taller central attic. The rear gardens are terraced into the hillside behind and include a semicircular area with an elaborately articulated rear wall incorporating statues and fountains; marking the vista at the head of a flight of steps behind is a pair of large and ornate free-standing helical columns.

Palazzo Zuccari, Rome (*c.* 1590), the palace which the painter Federigo Zuccari designed for himself, has a garden facade with a portal and windows conceived as giant masks reminiscent of the cave at Bomarzo. The horrible faces would form a contrast with the sophisticated delights of the garden behind.

Domenico Fontana (1543–1607), from Lugano, achieved distinction as architect to Sixtus V. Although very typical of their period, his buildings can be very dull, for example his elephantine **Lateran Palace, Rome** (1586–), a watered-down version of the Palazzo Farnese. He was particularly influential in the field of town planning.

Capella Sistina, S. Maria Maggiore, Rome (1585–), designed for Sixtus V, has an unremarkable cruciform plan, but its sumptuous interior is the first of many to be veneered with polychrome marble.

The new streets centring on S. Maria Maggiore (*c.* 1587) are among several laid out by Fontana for Sixtus to link the principal pilgrimage churches. Four here converge at the church, one sighted on an obelisk moved from the Mausoleum of Augustus. Obelisks were erected for similar effect elsewhere—at the Piazza del Popolo, the Lateran, and in front of S. Peter's.

Baroque and Rococo

Carlo Maderno (1556–1629), a nephew of Domenico Fontana, introduced a vigorous, sculptural approach to architectural design in the first decade of the seventeenth century. Apart from his additions to the basilica of S. Peter, Rome (p.872) his designs include the **Palazzo Mattei, Rome** (1598–1616), and the dome of S. Andrea della Valle, Rome (q.v.).

The mediaeval church of **S. Susanna, Rome** (1597–1603) (p.899A), was radically transformed by Maderno who redecorated the interior, inserted a crypt, added convent buildings and, most importantly, designed its impressive facade. Conceived as a dramatic frontispiece, the facade relates to the piazza rather than the very small church it screens. Symmetrical three-bay convent buildings flanking the facade are differentiated from the church by the use of brick rather than stone, but are visually unified by horizontal alignments and by the crowning balustrade which is inventively extended over the church's pediment. The facade has a five-bay lower storey with three bays above. The bays become emphatically wider towards the middle, breaking progressively forward, while the applied ornament becomes more sculptural.

Constructed for the Barberini family of Pope Urban VIII, the **Palazzo Barberini, Rome** (1628–33) (p.900A,B) became the most significant domestic building in early seventeenth-century Rome. All leading architects of the Roman Baroque contributed to its design. It was begun by the aged Maderno, with contributions in detailing from his nephew, Borromini. At Maderno's death in 1629, the precocious Bernini was appointed architect while Pietro da Cortona furnished the design of the theatre. The building differs from town palaces in its surrounding gardens and its unusual H-shaped plan, which together with the open, arcaded facade give a villa-like effect. The seven-bay central block has three Classical superimposed orders rising above the adjoining wings. An attic over the central three bays corresponds to the top of the huge first-floor sala adorned with Cortona's impressive ceiling fresco. Novel features of the plan are the square, open-well staircase, the stoa-like ground-floor atrium, and the now destroyed transverse oval sala, which was later to appear in Bernini's architecture.

Few buildings by Francesco Maria Ricchino (1583–1658) have survived, and perhaps as a result history has dealt roughly with him. The **Collegio Elvetico (Swiss Seminary), Milan** (1627), has one of the most remarkable facades of its time; while its component parts owe much to Michelangelo (for example the window frames) and to sixteenth-century Florentine palace architecture (for example the quoins), its most notable feature is the concave plan. The Vignolesque balconied doorway is emphasised by the convex balustrade which contrasts with the curve of the facade, a practice which heralds the architecture of the great trio of seventeenth-century Rome, Borromini, Bernini and Cortona.

The plan of Ricchino's **S. Giuseppe, Milan** (1607–30) (p.899B), is of a type going back to the sixteenth-century churches of Antonio da Sangallo the Younger and Sanmicheli. Of the two adjoining centrally planned spaces, both Greek cross in form, one is intended to house the altar, the other the congregation. The larger of the two has shallow arms little deeper than the width of the columns that frame them. Both spaces differ in interior elevation, most significantly in their upper zones. Pendentives support a dome in the larger space, while a simple cross vault crowns the chancel. In contrast to many Renaissance centrally planned churches a significant directional emphasis is given to the building by its ornamental facade, in which one pedimented tabernacle is set within another, concentrating attention on the facade's centre. This type of 'aedicule facade' became one of the most popular during the Baroque era.

Giovanni Battista Aleotti (1546–1636) was the leading architect in early seventeenth-century Emilia. His **Teatro Farnese, Parma** (1618–28) (p.899C), is modelled on those of Palladio in Vicenza (q.v.) and of Scamozzi. The deep U-shaped auditorium is closer to that of Scamozzi's theatre in Sabbioneta, as is the treatment of the proscenium arch, but the novel two-tier arcade looks back to Palladio's Basilica, Vicenza (q.v.).

The imposing **Palazzo dell'Università, Genoa** (1630) (p.902A,B), built as a Jesuit college, was designed by Bartolommeo Bianco (*c.* 1590–1657), Genoa's leading Baroque architect. Bianco here capitalised on the potential of the steep sloping site, characteristic of the city. The differing levels allow for spatial experiments with staircases, now becoming a more fundamental aspect of architecture than ever before. The arcades with paired columns look back to Alessi's work in Genoa and Milan. The inspiration for the vista from vestibule through courtyard to staircase can be found in Rocco Lurago's Palazzo Doria-Tursi, Genoa (q.v.).

The **Villa Borghese, Rome** (1613–15), built for Scipione Borghese by the Flemish architect Giovanni Vansanzio, stands in gardens immediately outside the Aurelian walls. It fits into the tradition of the 'villa suburbana', an antique building type revived in the sixteenth century from ancient literary descriptions. The core of the structure is a rectangular block to which are attached four tower-like wings, a vestige of castle design. Those at the front are lower than the central block while those behind are taller. This gives the villa a predominant axis as well as a principal viewpoint. It is entered through the once open arcade which led into a small courtyard. By contrast with its most important model, the Villa Medici, Rome (q.v.), it is the main facade rather than the garden front which is studded with niches and roundels containing fragments of ancient sculpture.

The ancient church of **S. Sebastiano fuori le Mura, Rome** (1609–13), was renovated by Flaminio Ponzio for Scipione Borghese and completed by Vanşanzio, the builder of the Villa Borghese. The monochrome architecture adopted here contrasts strongly with Ponzio's contemporary multi-coloured **Cappella Paolina, S. Maria Maggiore, Rome** (1605–11), as does the restrained Classicism of the design. The paired columns used on the facade were a popular motif at this time, as witnessed by the Palazzo dell' Università, Genoa (q.v.).

Francesco Borromini (1599–1667), whose use of curvilinear forms to create vital spatial effects was to revolutionise architecture, came to Rome from Lombardy as an itinerant mason. His links with the Fontana and Maderno families made initial entry into the Roman artistic scene relatively easy, but an antipathy for the pre-eminent Bernini was not to help his career. His first independent commission was from the Trinitarian order to design **S. Carlo alle Quattro Fontane, Rome** (1634–82) (p.903A), one of the masterpieces of Roman Baroque architecture. Complexity characterises both plan, combining elements of oval and Greek cross, and interior wall treatment, which can be read in two ways. Overlapping three-bay units focus attention now on the altars, now on the subsidiary chapel openings. Thus the eye moves constantly around a structure which has no strong visual caesuras. The oval dome with its elaborate 'all'antica' coffering is set directly on pendentives without a drum and is crowned by an oval lantern. The exterior profile of the dome is enclosed, following Lombard rather than Roman models. The undulating facade symbolically heralds the interior by taking up its triadic bay system. The upper level was completed after Borromini's death by his nephew and probably does not follow his design. The buildings also include a convent, an elaborate crypt and a courtyard, all ingeniously laid out and highly unconventional in plan and detailing.

The **Palazzo Falconieri, Rome** (1646–49), though much altered, is still Borromini's most significant essay in domestic architecture. He remodelled earlier buildings on the site, endowing them with such hallmarks of his style as the punning falcon-headed capitals of the facade, and the curvilinear concave ends of the sculptural belvedere.

The **Collegio di Propaganda Fide, Rome** (1662) (p.903B), was built as a training centre for missionaries, Borromini providing two courtyards and a chapel. The giant pilasters of the facade, at once uncanonical and severe, flank impressive concave window embrasures with alternating segmental and triangular crowning motifs. In the central entrance bay, emphasised by its concavity, the triangular window now becomes convex. The chapel which the facade masks is remarkable for its attempt to create a coherent, visually unified space; the skeletal structure of pilasters continues up through the entablature and across the vault in a unifying stucco network.

Perhaps Borromini's most prestigious commission was to renovate the venerable basilica of **S. Giovanni in Laterano, Rome** (1646–69) (p.903C). The alterations included encasing much of the early Christian nave and four aisles in stucco-covered brick. The piers were decorated with marble tabernacles whose convex pediments front oval canopies combining ideas of pediment and crown. The pomegranates carved in the nave capitals allude to the biblical descriptions of the Temple of Solomon.

The **Oratory of S. Philip Neri, Rome** (1637–50) (p.900C), is the central house of the Oratorians, a Counter-Reformation order founded by S. Philip Neri. Granted the church of S. Maria in Vallicella, the order began the adjacent conventual buildings in the early seventeenth century to the designs of Paolo Maruscelli. Borromini, elected to replace Maruscelli, was in large part limited by his predecessor's plan. The most impressive feature is the facade. Built in brick so as not to rival the adjacent church front by Fausto Rughese (1605), it is one of the earliest monumental concave facades. It is unconventional in much of its detail—for example the crowning pediment which fuses triangular and segmental types.

S. Ivo della Sapienza, Rome (1642–50) (p.903D), is the chapel attached to the university begun in the mid-sixteenth century by Pirro Ligorio and continued under Giacomo della Porta. The chapel's unusual plan is composed of two interlocking triangles forming a six-pointed star whose ends are alternately convex and concave curves. The form chosen was certainly symbolic, referring to the star of wisdom (sapienza) and possibly to the bee found in the coat of arms of the patron, Urban VIII. The most remarkable feature of the structure is the way in which the star-shaped plan is retained in the dome, gradually transforming itself into the circular oculus on which the lantern stands. As

X, and completed late in the seventeenth century by Carlo Fontana. The vast facade is composed of five sections, each symmetrical about its own centre. The bay sequence 3-6-7-6-3 stresses the centre and portal, as does the angling of the five sections which, though individually straight, give the appearance of a curved front, an idea perhaps suggested by the Palazzo Massimi alle Colonne.

Pietro da Cortona (1596–1669) repeatedly claimed to be a painter rather than an architect but operated as both with equal success. His experiments in the spatial unification of piazzas and the modulation of wall surfaces were remarkably influential.

SS. Martina e Luca, Rome (1635–50) (p.908B), was built on the site of a church used by the Academy of S. Luke, founded in 1593, one of the earliest academies of art. During excavation for Pietro da Cortona's tomb a body was unearthed and generally taken to be that of S. Martina. Francesco Barberini, Cortona's patron, immediately undertook to construct the church *de novo*. Cortona's Greek-cross plan, a traditional form for memorial architecture, seems at first glance entirely symmetrical, but the length of the main axis is exaggerated: the bays and apses are deeper than those of the transept arms. It is surprising that Cortona allowed so little space in the church for what was after all his main profession—painting. This perhaps reflects a belief that one art form should not be compromised by another, an attitude altogether different from that of Bernini. The two-storey facade squeezed between embracing piers is the earliest of the Baroque to adopt a curving plan. Cortona has dissolved the wall surface, constantly varying the plane with inserted columns and applied pilasters, thereby subtly creating a dramatic climax at the centre.

The **Vigna del Pigneto, Rome** (before 1630), once sited near the Vatican, is Cortona's earliest architectural work. Fountains and ponds mark the dominant axis with Baroque theatricality. Terraced into the hillside, the villa is approached by a series of ramps, two of which are functionless, contributing solely to the splendour of the ensemble. While the villa looks back to Palladio in its curved wings and to Bramante for its apsidal focus, the composition as a whole is novel.

Cortona's facade for **S. Maria in Via Lata, Rome** (1658–62), is a two-storeyed portico rather than a veneer. The progressive widening of intercolumniations toward the centre emphasises the entrance, as does the arcuated lintel above—a motif found in Renaissance architecture, but ultimately deriving from such antique models as Diocletian's Palace at Split.

Cortona modernised the facade of **S. Maria della Pace, Rome** (1656–57) (p.912A), and entirely reorganised the small forecourt in front. The design marks a new departure in the planning of piazzas. All the sides of the square have been designed to set off the facade, while two of the three streets leading into the square have been masked to produce a greater cohesion. The concave wings flanking the facade on the first storey give an illusion of greater space, and contrast effectively with the convex facade. Above the semi-oval portico the facade recalls that of S. Martina and Luca but uses a different system to produce a central climax. Here there is a sculptural build-up from flat panel, to pilaster, to column.

Carlo Rainaldi (1611–91) and his father Girolamo formed one of the leading family practices of seventeenth-century Rome. They worked largely as a team, but Carlo produced his best buildings after his father's death. His design for **S. Maria in Campitelli, Rome** (1663–7) (p.911C), has a barrel-vaulted nave followed by a domed presbytery full of light. The strong columnar impression of the interior is carefully gauged to emphasise the chapels. The sculptural facade, of the 'aedicule' type, presents a complexity in the treatment of planes that owes much to Cortona.

The **Piazza del Popolo, Rome** (1662–79), immediately inside the northernmost gateway into the city, gave most travellers their first impression of Rome. Alexander VII entrusted the task of monumentalising the square to Carlo Rainaldi. Three streets converged at this point, forming two wedge-shaped sites facing the gate. Rainaldi planned two churches with large domes, **S. Maria di Monte Santo** and **S. Maria dei Miracoli** (p.909A), as pavilions on either side of the central street. The different shapes of the seemingly identical domes (one being oval, the other circular) are the result of the differently shaped sites.

SS. Vincenzo ed Anastasio, Rome (1646–50), was planned by Martino Longhi the Younger (1602–60), a member of a large dynasty of Roman architects. The facade facing the Piazza di Trevi is his major work. Two groups of three boldly conceived columns flank the main door, and the motif is repeated in the upper storey. The columns break progressively forward and each pair is joined by a pediment, giving the impression of three superimposed aedicules. On careful reading the systems of the two tiers differ in conception but this does not detract from the powerful effect.

Carlo Fontana (1638–1714) ran the most influential architectural practice in late seventeenth-century Rome. He had worked as a draughtsman for many of the masters of the previous generation—Bernini, Cortona and Rainaldi—and was to pass their ideas on to the international scene through his pupils, for example Juvarra, Pöppelmann and Gibbs (q.v.). His facade of **S. Marcello al Corso, Rome** (1682–3) (p.911D), by contrast with those of Borromini and Cortona, is easy to read, looking back to the relative simplicity of Carlo Maderno's S. Susanna (q.v.). His buildings are representative of a Classical trend in Roman late Baroque.

Carlo alle Quattro Fontane the dome is encased rum and is surmounted by a spiral lantern which een variously interpreted as the Tower of Babel, ghthouse of Alexandria, the biblical pillar of fire, ven the papal tiara.

Agnese, Rome (1652–) (p.906A), built as part of evelopment of Piazza Navona by the Pamphili Innocent X, was integrated into the large palace occupies the west side of the square. It was by Gerolamo and Carlo Rainaldi, altered first rromini and then again by Carlo Rainaldi. Bori's concave facade has the effect of making the very prominent and fully visible. The device of s framing a dome was to become especially lar in eighteenth-century Austria.

sculptor-architect Giovanni Lorenzo Bernini –1680), born in Naples, was the pre-eminent of the Roman Baroque. He introduced a new sity into sculpture with his ability to create textural effects in stone, and exploited the arts nting and architecture to control the spectator's ience and to vitalise and dramatise his sculpttings. However, his approach to architecture rgely Classical and he could never come to with the licence of Borromini's inventions.

ndrea al Quirinale, Rome (1658–70) (p.906B), gun as the chapel of a Jesuit seminary. Having ly suggested a pentagonal plan, Bernini ulti- chose one of his favourite forms, the transval, with entry on the short axis. Ten openings g to portals and chapels set into the thickness of ll do not detract from this simple conception. trast to Borromini's monochrome architecernini, here as in his sculpture, used volupmulti-coloured marbles. The design is so mand that the three arts of painting, sculpture and cture relate the story of S. Andrew. Crucified ainting on the high altar, he then, transformed ulpture, rises to heaven through the broken nt of the columnar screen, while putti in the of the dome descend to show him the route. e of colour is also symbolic, pink for the terdomain and gold for the dome of heaven. The ombines two previously alternative vaulting coffering and ribs. The high altar is visually and physically separated from the main cononal space by a columnar screen. This is d by the springy oval porch which is the focal f the concave forecourt.

e **Cappella Cornaro, S. Maria della Vittoria,** 1645–52) (p.906C), Bernini successfully empainting, sculpture and architecture to create his most spectacular effects. Encased in an ine, invitingly thrust forward by the architec. Teresa is seen in the ecstatic throes of a Raking light from a hidden source dramatises e and also symbolises the mysterious hand of er vision is watched by members of the Cornily, sculpturally portrayed in balconies at the chapel's sides. The visitor becomes a participant in the visionary scene, an effect emphasised by the virtuosity of sculptural technique. Such resources became standard elements in Baroque chapel design.

The **Piazza of S. Peter's, Rome** (1656–) (pp.902C, 905), is a forecourt impressive enough to match the most important church in Roman Catholic Christendom. Bernini designed a vast oval piazza surrounded by Doric colonnades. Although the area is open towards the east, Bernini's original intention was to close most of this gap, leaving two symmetrically placed entrances either side of the main axis. In the seventeenth century the piazza was reached from the narrow streets of the Borgo (the present Via della Conciliazione was widened in the 1930s), and the contrast between confinement and open space would originally have been much greater. In designing the piazza, Bernini had to take into account the functions of Benediction from both S. Peter's and the Vatican palace. A relatively low colonnade permitting wide visibility for pilgrims was the result. However, four columns deep from many viewpoints, the colonnades give the spectacular impression of a forest of verticals.

At the bottom of Bernini's **Scala Regia, Vatican, Rome** (1663–66) (p.906D), the arms of Alexander VII break the curve of the arch and are celebrated by trumpeting angels. Bernini brilliantly overcame site restrictions in designing this new ceremonial stair. The converging walls gave him the chance for perspective illusion. The columns, vault and steps all diminish in size and give the impression of greater length and monumentality. A shaft of light breaks the visual ascent, creating the chiaroscuro of stage lighting.

S. Maria Assunta, Ariccia (1662–64) (p.908A), a domed, cylindrical structure preceded by a portico, is closely modelled upon the Pantheon, a building which Bernini had renovated in the previous decade. Ariccia differs mainly in the adoption of an arcaded portico. This is well suited to the design as blind arches decorate the exterior of the rotunda and also frame the interior chapels. A vast embracing structure emphasises the centralised nature of the design. As at S. Andrea al Quirinale, the iconography of the dedicatory saint adorns the interior.

The **Palazzo Chigi-Odescalchi, Rome** (begun 1664) (p.909B), though substantially altered in the eighteenth century, holds an important position in the development of Roman palace facades. In place of the traditional astylar type of Sangallo and Fontana, here is a pilastered facade which looks back to Bramante's Palazzo Caprini (q.v.). Eight bays divided by Corinthian pilasters stand above a basement with a single Doric portal. The tripartite facade originally had a central stylar section framed by two recessed three-bay wings.

The **Palazzo Ludovisi** (now **Palazzo di Montecitorio**), **Rome** (1650), was built for the family of Innocent

nice

dassare Longhena (1598–1682), Bernini's almost ct contemporary, was the most distinguished ıetian architect of the seventeenth century. His rch **S. Maria della Salute, Venice** (begun 1631) ›11A,B), was, like Palladio's Redentore (q.v.), ımissioned by the Venetian state to mark the end plague. The building is composed of two domed, trally-planned spaces: an octagonal congregation- rea with an ambulatory and a square chancel with flanking apses. The chapels, linked by hidden ·idors, protrude from the exterior of the octagon. n earlier Venetian churches the interior is strictly ıochrome. The apsidal transepts of the plan look k to Palladio's Redentore, and in overall con- ration the layout resembles Sanmicheli's Madon- li Campagna, Verona (q.v.), both votive chur- ;. The exterior has an entrance portico in the form triumphal arch, and the drum is visually united ı the lower storey by giant highly sprung scrolls ›ed with statuary.

onghena's **Palazzo Pesaro, Venice** (1652–1710), is vily indebted to the palace type established by sovino. The strongly sculptural seven-bay facade ps around the corner, a traditional Venetian fea- . The rusticated bottom storey has two entrances, ⁄as popular in palaces owned by brothers. The hmic single and paired column articulation of the er storeys produces the characteristically Vene- tripartite effect.

in

rino Guarini (1624–83), a Theatine priest, was ıtellectual fascinated by three-dimensional geo- y, and his architecture is characterised by spatial :rimentation. He was more open-minded than his emporaries about Gothic architecture and in- ed Gothic forms among the orders in his post- ously published treatise, *Architettura Civile*, of . Although he worked predominantly in Turin, lings by him were erected as far afield as Lisbon ⁄aria da Divina Providencia, q.v.) and Paris (S. e la Royale, 1662–).

ıarini's **Cappella della S. Sindone, Turin** (1667– pp.912B, 913), is attached to the east end of the :dral. This intriguing circular structure was built ›use the Turin Shroud, owned at that time by the ıl House of Savoy. The wall is divided into nine l bays and, above, an unusual triangular penden- system converts the large circle of the ground into the smaller circle of the drum. This theme is ed in microcosmic form in the entrance vesti- ;. Two elaborate types of coffering differentiate from pendentive, one of Guarini's favourite ts. The high arches of the drum break into the where the circle is turned into a hexagon. By a succession of open ribs acting as squinches, the vault converges on a suspended twelve-pointed star. On the exterior, the typical Lombard drum enclosing the dome is stepped and crowned with a helix not unlike Borromini's S. Ivo, Rome (q.v.).

At **S. Lorenzo, Turin** (1668–87) (p.914), the rectangular block-like exterior, with its rectangular altar chapel at the back and portico at the front, gives little idea of the extraordinary interior. Inside, Guarini converted a square into an octagon with curved sides bulging into the main congregational area. The sense of spatial complexity is increased by the curvilinear entablatures inside the chapels. Ingeniously, the octagon is converted into a Greek cross at pendentive level and then into a circle at the base of the drum. The interlacing open ribs restate the octagonal theme and create a rich diaphanous effect.

The **Palazzo Carignano, Turin** (1679), is the best-known of Guarini's domestic buildings. The undulating central section encloses paired grand staircases and a large oval hall. The facades are built of unstuccoed terracotta, moulded to form extravagant window frames and idiosyncratic rustication.

Filippo Juvarra (1678–1736) was born in Messina and grew up with Guarini buildings on his doorstep but trained with Carlo Fontana in Rome. It was only after Vittorio Amedeo II of Savoy had been made the King of Sicily and requested his services in Turin that Juvarra emerged as a prominent architect. He also worked extensively in the applied arts and theatre design.

Vittorio Amedeo II, commissioning the **Palazzina di Stupinigi, near Turin** (1729–33), enabled Juvarra to create one of the most extravagant villas of the late Italian Baroque. Juvarra abandoned the bi-axial rectangular plans of earlier villas and introduced a theme based upon the tri-axial hexagon. An entrance court leads to a magnificent enclosed hexagonal piazza with openings into and through the palace at all the corners. Dominating the piazza is the oval domed block housing a huge access hall, the focal point of the plan through which all the axes pass. This block is differentiated from the rest of the complex by its curvilinear form, apparent in both its plan and its arched windows. The stag crowning the dome indicates the palace's function—a hunting lodge.

Founded as a hilltop sanctuary, the **Superga, near Turin** (1717–31) (p.912C), combines church and monastery into a single unit. The church is in front of a rectangular cloister and dominates the conventual buildings, from which it is distinguished by scale and materials. The church is preceded by a projecting square portico which invites entry on each of three sides. Inside, Juvarra confronts the visitor with a single tall cylinder which has windows in both dome and drum, and chapel openings at the lower level. In its simplicity it contrasts strongly with the churches of Guarini erected less than fifty years earlier.

Juvarra's **Palazzo Madama, Turin** (1718–21), built for Vittorio Amedeo II of Savoy, reflects the strong connections between French and Piedmontese architecture. The nine-bay facade, with its central projecting portion articulated with columns rather than pilasters, resembles in its general lines the garden front of Versailles (q.v.). Almost the whole width of the facade is taken up on the interior by a grand staircase hall.

Bernardo Vittone (1702–70), who worked mainly in Piedmont, assimilated the styles of both Guarini and Juvarra. The exterior of the **Sanctuary, Vallinotto, near Turin** (1738–39), consists of four diminishing superimposed tiers similar in vein to Guarini's reinterpretation of the northern Italian tradition of enclosed domes. The plan is hexagonal, each side housing a semicircular chapel. Alternate chapels have convex balconies. As at Guarini's S. Lorenzo there is a semicircular ambulatory behind the high altar. Particularly fascinating is the spatial experimentation in the dome. Six interlocking open ribs permit a view through to three successive vaulted levels—two frescoed domes with diminishing oculi, crowned by the lantern. In contrast to Guarini's methods of changing plan at every level, Vittone retains the hexagonal form throughout and attempts to unite horizontal zones visually.

The **Church of S. Croce, Lecce** (1606–46), has a Baroque exuberance which owes much to Sicily and Naples but also incorporates Romanesque ideas, such as the console figures supporting the balcony and the foliate rings halfway up the column shafts. Plain surfaces are contrasted with zones of intense low-relief decoration.

Rococo

The **Palazzo Stanga, Cremona** (early eighteenth century) (p.916B), has a tripartite nine-bay facade of which the central three bays are set off by pilasters, paired either side of the portal. The fanciful curving frames of the arches and windows are characteristic features of Rococo architecture.

Designed by Carlo Francesco Dotti (1670–1759), the Marian sanctuary of the **Madonna di S. Luca, Bologna** (1723–57) (p.916A), stands on a hill outside the city walls. Elaborate arcades line the pilgrimage route to the shrine. An undulating facade fronts the oval exterior of this curvilinear Greek-cross church.

Francesco de Sanctis (1693–1740) turned the grassy slope linking the Piazza di Spagna, Rome, with the church of the Trinità de'Monti into a dramatic staircase known as the **Spanish Steps** (1723–5) (p.917A). At the base the broad steps are divided into three flights; as at Michelangelo's Laurentian library (q.v.) the central flight billows out into the square. Ascending the hill, the flights narrow and fuse, part and expand onto a broad landing, and diverge again into two curving ramps leading to the upper piazza.

In **Piazza S. Ignazio, Rome** (1727–8), Filippo Raguzzini (*c.* 1680–1771) reworked a theme established by Cortona at S. Maria della Pace (q.v.), using the elevations of several different buildings to form a unified space—here composed of three connecting ovals. The design decision here concerned the shape of the space rather than the buildings—a departure from Renaissance ideas on urban planning.

The **Trevi Fountain, Rome** (1732–7) (p.917B), was designed by Niccolo Salvi (1696–1751) who developed Cortona's idea of fusing a palace facade with a fountain. This fountain marks the end of the ancient aqueduct (the Aqua Virginis) and replaced a fifteenth-century structure. The use of the triumphal arch motif in this context was probably borrowed from the nearby fountain erected by Sixtus V to decorate the end of the Acqua Felice. The fountain does not simply stand in front of the palace but is fused with it; the man-made rock formations from which the water gushes climb high up the basement level.

The facade of **S. Giovanni in Laterano, Rome** (1733–6), was designed by Alessandro Galilei (1691–1737). In essence this example of late Baroque Classicism was modelled upon Maderno's facade for S. Peter's, Rome (q.v.). There is, however, a greater emphasis on verticality achieved through the closer spacing of the giant columns, and also on chiaroscuro attained by means of opening up much more of the facade to create contrast. The vocabulary used takes its lead from Bernini rather than Borromini.

The **Palazzo Sanfelice, Naples** (1728), was designed by the most gifted and prolific early eighteenth-century Neapolitan architect Ferdinando Sanfelice (1675–1750), unsurpassed master of staircase design. Here the stairs fill an entire side of the courtyard and are open on both sides so that the function of ascent is expressed on the courtyard elevation.

The facade of **S. Gregorio, Messina** (tower 1717, facade 1743), illustrates the exuberant imagination of Sicilian eighteenth-century architecture. Though heavily indebted to Borromini's S. Ivo (q.v.), the helical spire is by no means a copy. It is embraced by miniature versions of itself, and at its summit sit a papal tiara and keys proclaiming the importance of the succession of S. Peter. The facade transforms the pediment into a vital surging crown. Its acute apex and appended crockets resemble Gothic gables. A window bursts into the entablature, producing an interesting essay in flamboyant arcuation.

S. Giorgio, Ragusa Ibla (1746–75), was designed by Rosario Gagliardi. This facade type, typical of eighteenth-century Sicily, has several diminishing tiers and fuses the notions of church facade and bell tower. The triple break forward is marked by free-standing columns recalling SS. Vincenzo ed Anastasio in Rome (q.v.), while the gently curving central bay augments the tower-like impression. Further extravagant examples of this type are **S. Giorgio, Modica** (eighteenth century), and **S. Placido, Catania** (finished 1769).

Villa Valguarnera, Bagheria (1709–39), by Tommaso Napoli, is one of several exciting eighteenth-century villas surrounding the town. An elaborate double-ramp staircase undulates in the deep concave facade and opens into the convex entrance porch which dominates the centre. Other nearby villas are **Villa Palagonia** (1705) and **Villa Larderia** (*c.* 1752).

Neo-Classical

Giovanni Battista Piranesi (1720–78), best known for his dramatic architectural etchings and for championing Roman architecture at the expense of Greek, produced at **S. Maria del Priorato, Rome**, his most important essay in built architecture. Designed for the Knights of Malta, the church is situated in an elaborate five-sided piazza. Much of the decoration has symbolic significance, the Knights' emblems being freely interpreted in the facade capitals. The obelisks punctuating the piazza reflect Piranesi's fascination with ancient Egypt.

Designed by Giovanni Antonio Scalfarotto (1690–1764), **SS. Simeone e Giuda, Venice** (1718–38) (p.917C), departs from the exuberant forms of Longhena's S. Maria della Salute (q.v.) and moves toward a more rigid Classicism, inspired by the Pantheon. A pedimented portico gives on to a rotunda through an intermediary block, and inside there are projecting tabernacles and columnar screens. The dome is of the stilted Byzantine type traditional to Venice.

The facade of **S. Nicolò da Tolentino, Venice** (1706–14), marks a change in direction in the work of Andrea Tirali (1657–1737). While his earlier work, such as the chapel of S. Domenico in SS. Giovanni e Paolo, is in a High Baroque tradition, S. Nicolò is more Classical in vein. A pedimented hexastyle portico of a type projected by Palladio, but new in Venice, is all that was built. The Corinthian columns respond to the pilasters of the inner facade. It is the extravagant oval in the pediment that distinguishes it from its Palladian ancestors and its neo-Classical descendants.

Luigi Vanvitelli (1700–73), the son of a Dutch landscape painter, was commissioned by Charles III of Naples to build the **Royal Palace, Caserta** (1752–) (p.918A), situated twenty miles north of Naples. The vast palace, with its 1200 rooms, includes four courtyards arranged in a grid-like pattern reminiscent of the Escorial, Madrid (q.v.), or Inigo Jones's designs for Whitehall Palace. A love of symmetrical exactitude is revealed in the reiteration of the central octagonal vestibule in the two other entrance halls on the same axis. These open octagonal spaces provide a variety of vistas, often in several directions at once. Although the scenographic effects look back to Baroque interests, the austere plan and facades look towards the neo-Classical future.

Vanvitelli's design for the **Piazza Dante, Naples** (1755–67), transformed the concave sweep of seventeenth-century church and palace facades into a crescent. It is dominated at the centre by a clock tower set on a triumphal arch which in turn leads onto a street; this idea is not dissimilar to the gateways of French châteaux, but the vocabulary comes from Bernini's Piazza of S. Peter's (q.v.).

The **Tempietti, Villa Albani, Rome** (c. 1760), were designed for Cardinal Albani by Carlo Marchionni (1702–86) as garden pavilions for his new villa (begun 1746). Albani had as artistic adviser the most important theoretician of the age, J. J. Winckelmann. While the villa is late Baroque in style these tempietti take a fresh look at Classical antiquity. Similar in conception to eighteenth-century English follies, the Tempietto Diruto is built from spoils of ancient buildings. It was conceived not as a reconstruction of antiquity but as a ruinous symbol of transience.

While Michaelangelo Simonetti (1724–81) was the architect of the **Museo Pio Clementino, Vatican, Rome** (begun 1771), it was Pope Clement XIV who conceived the idea of transforming the northern end of the **Cortile del Belvedere** (q.v.) into a permanent museum. The sixteenth-century sculpture court of the Belvedere was transformed by the insertion of an octagonal colonnade. More impressive is the **Sala Rotonda** (1776–), a domed, cylindrical structure consisting of a ring of identical niches framed by an order of Composite pilasters. In the attic, thermae windows repeat the curve of the niches below and provide strong light for the exhibits. Echoes of Renaissance architecture are stronger in the **Sala a Croce Greca** (begun 1776) which, with its bevelled corners at the crossing, resembles Bramante's church designs. As at the Villa Albani Tempietti (q.v.), antique materials were employed in the construction; ancient granite columns and figures are used as supports while Roman mosaics are set into the floor.

The renovation by Giacomo Quarenghi (1744–1817) of the church of **S. Scolastica, Subiaco** (1774–77), was to provide a model for many subsequent neo-Classical church interiors. A simple barrel-vaulted nave is flanked by apsidal chapels. The vault is raised and widened at the chancel and the altar is set in an apse whose half-dome is supported by Ionic columns, creating a screen similar to that in Palladio's Redentore (q.v.). Apart from occasional garlands the wall surface is unadorned.

La Scala, Milan (1776–8) (p.918B), by Giuseppe Piermarini (1734–1808) is one of many theatres built in the late eighteenth century. The seven-bay facade has an arcaded ground floor with flat banded rustication, while the upper level is articulated with an order school children and their teachers from all over the country, as well as a museum. A planetarium on the site is linked to the new building, which is entered under a 15 m (49 ft) canopy from the adjacent science park. Its concrete high-tech image is maintained in the **Siam Motors Industrial Estate Building, near Bangkok** (1978). Other buildings by this architect in Thailand include a **guest house at Pattaya** (1973) and the **Bank of Asia at Warin** (1976).

The rapid urban development of Singapore since the island became an independent state in 1965 can perhaps be shown best in two buildings which may also be compared with similar examples in Hong Kong. The work of DP Architects (until 1975 Design Partnership) is synonymous with the name of William Lim (Siew Wai) (b. 1932). His **People's Park Complex, Singapore** (shopping completed 1970, residential block 1973) (p.1498A), represents the nature of the city's growth on the heels of commercial success. It is an exposed concrete building with a Corbusian air about it—soon dispelled inside the shopping area with its ground-floor exhibition and display space. But perhaps even more characteristic of the new Singapore is the **Overseas Chinese Banking Corporation Headquarters Building** (1979) (p.1498B) designed by BEP Akitek with I. M. Pei as design consultant: structural engineers were Ove Arup and Partners. It is a fifty-two-storey tower with a semicircular services core at each end. A four-storey high banking hall at ground level is spanned by 34.5 m (115 ft) post-tensioned concrete box-girders between the cores, and these beams carry the three stacks of intermediate floors at the fourth-, twentieth- and thirty-fifth-floor levels, thus enabling the clear-span office floors also to be constructed as the core blocks rose.

The same period of rapid high-rise development in Hong Kong since the 1950s can be represented here only briefly, and excludes the numerous residential and office buildings in the International Style which have sprung up to make the city one of the most dense urban localities on earth. The **Hong Kong Arts Centre** (1977) (p.1498C) is by Taoho Design Architects, a practice which has a Chinese principal, Tao Ho, born in Shanghai in 1933. The aim of the arts centre is to encourage exchange between the art forms of east and west. Tao Ho was one of the initiators of the scheme, which was financed by public subscription and built on a minimal government-donated site 30 m (100 ft) square. The building includes a recital hall and two small theatres. With its girder-fronted spandrel walls, the appearance of the building makes an interesting contrast with the high-tech imagery of the **Hongkong Bank** (1986) (pp. 1498D, 1499), designed by Foster Associates of London (Norman Foster, born 1935); structural engineers were Ove Arup and Partners. Here the column-free open floors are made possible by the most technologically advanced of all modern constructional systems, in which the office floors are suspended from steel pylons and counterbalanced on two sides of the building by the service cores, risers and staircases. The building is almost 179 m (587 ft) high with a basement 19 m (62 ft) deep. The building is extensively glazed with a double-skinned curtain wall. The suspension trusses supporting the clear floor spaces give the building its characteristic appearance.

Bibliography

Contemporary Asian Architecture. Process Architecture series, No. 20. Tokyo, 1980.

DAVIES, P. *Splendours of the Raj: British Architecture in India, 1660 to 1947*. London, 1985.

DOXIADIS, C. A. *Ekistics: an Introduction to the Science of Human Settlements*. London, 1968.

GIURGOLA, R. and MEHTA, J. *Louis I. Kahn*. Boulder and Zurich, 1975.

HITCHCOCK, H.-R. *Architecture: Nineteenth and Twentieth Centuries*. 4th ed. Harmondsworth, 1977.

HITCHCOCK, H.-R. and JOHNSON, P. C. *The International Style*. New York, 1932.

LAMPUGNANI, V. M. (Ed.) *Encyclopaedia of 20th Century Architecture*. London, 1986.

LE CORBUSIER. *Oeuvre Complète*. 7 vols. Zurich, 1935–65.

MIMAR. Nos. 2, 6, 14, 15, 17. Singapore, 1981–5.

NILSSON, S. *The New Capitals of India, Pakistan and Bangladesh*. Lund, 1973.

RICHARDS, J. M. *New Buildings in the Commonwealth*. London, 1961.

TAYLOR, B. B. *Geoffrey Bawa*. Singapore, 1986.

Chapter 47

OCEANIA

Australia, New Zealand, Papua New Guinea and the Smaller Islands of the South Pacific

Architectural Character

Australia

Australia was proclaimed a nation in 1901 when the colonial states were federated. During the following decades, although the historical styles persisted, the tendency in commercial architecture was towards more severe forms. By the end of the nineteenth century a Romanesque-based style, influenced by the contemporary architecture of Chicago, had appeared in strictly utilitarian buildings, but by the second decade of the twentieth century high rusticated bases and giant round arches brought an imposing scale to a wide range of building types. They were added to the more conservative architecture derived from that of the Victorian period, usually built in red brick and enlivened by plasterwork bands and cream-painted details. Art Nouveau reached Australia early in the century, primarily in the form of decorative motifs, but no notable buildings in that style were produced.

The first tall building, Culwalla House, Sydney, by Spain and Cosh, was completed in 1910. It stood 52 m (170 ft) high and was still in load-bearing brick construction—steel technology was still in its infancy and production limited. Concern over fire risk resulted in the introduction of building height limits in all cities. The limit was 45.7 m (150 ft) in Sydney and 40.2 m (132 ft) in Melbourne. Uniform height limits were retained in Australian cities until the end of the 1950s.

In domestic architecture the lively red-brick Queen Anne revival, with its varied roof forms and decorative timber work, was succeeded by the darkly toned California Bungalow. Architects' houses were romantically inspired by the work of Americans, such as Greene and Greene, whilst the simpler versions that reached Australia through builders' catalogues were rapidly accepted throughout the country.

Further romantic influences came from Walter Burley Griffin, who arrived from Chicago after winning the 1912 competition for the planning of the new capital of Australia at Canberra. Griffin was a member of the so-called *prairie school*, and his work was not widely appreciated at the time but its merits were rediscovered in the 1950s.

A reawakened interest in Australia's early colonial buildings contributed to a neo-Georgian revival. This probably was partly inspired by Sir Edwin Lutyens' later buildings, notably his bungalows for New Delhi (1913–30). Slightly later, Leslie Wilkinson introduced an architecture inspired by Mediterranean models, which he thought suitable for the climate. By the 1930s commercial buildings were showing the influence of Art Deco and the Gothic skyscraper style of New York. Australia also produced a large number of fine, confident buildings which reflected in their horizontal banding and streamlined curves the architecture of Eric Mendelsohn (q.v.). Brick and glass blocks figured prominently in such buildings as factories and warehouses. Outstanding were the new hospitals with balconies at each floor level.

The early modern buildings were solid in appearance and stocky in form, owing more to the work of architects such as Dudok than to buildings of the International Style. Functionalism was advocated but not fully understood. Melbourne was the centre of progressive thinking in the 1930s and produced the first convincing buildings in the white aesthetic of the Modern Movement, but architectural leadership soon passed to Sydney where the first pure examples of the International Style appeared.

After the years of austerity following the 1939–45 war, Australia entered a period of growth and prosperity. Air-conditioned curtain-wall buildings were built and in 1957 in Sydney and Melbourne the limits on building height were lifted. The 117 m (383 ft) high AMP Building, Sydney (1957–61), by Peddle, Thorp and Walker, was the first of the high-rise towers.

14-2-016 —18 pages

Chapter 23

SOUTH ASIA

Architectural Character

The earliest significant known buildings relate to Buddhism and Jainism and are therefore dealt with first below. Those relating to Hinduism were to follow soon after the beginning of the Christian era when the Vedic gods were superseded by the Trimurti of modern Hinduism.

Buddhist and Jain Architecture

The first known buildings date from the third century BC, but buildings before that date are recorded in the Vinayapitaka—that part of the Theravadin canon which describes the detailed regulations of the Buddhist order. The number and variety of shrines increased in subsequent centuries for a number of reasons: changes in Buddhism resulting from the teaching of the Mahayana sect, followers of the second of the three principal Buddhist canons which was to become prevalent in China; the evolution of the Theravadin canon itself; the practice of dedicating shrines to Bodhisatvas (earlier states of the Buddha before enlightenment).

The earliest Jain buildings were rock-cut caves commissioned by the Emperor Asoka in the third century BC for the use of Ajivika ascetics and were exact copies in rock of wood or thatch structures with highly polished walls, a technique inspired by Persepolitan prototypes. They marked the beginnings of rock architecture and of motifs and forms of expression seen in later Buddhist buildings. Later Jain temples are found mainly in the northern central part of the peninsula and although there were revivals of building activity, for example in the fifteenth century, the buildings are usually lifeless and show no real evolution. The central shrine, covered by a dome or spire, is introduced by a pillared portico, usually in the form of an octagon set within a square (p.750B). Although Jain temples are seldom simple, the most elaborate of them result from multiplication of the basic forms. The main difference between the Jain and the Hindu temple is the lighter and more elegant character of the former. The Jains paid particular attention to the siting of their monuments. The interiors of corbelled domes are elaborately carved with capstones treated as pendants internally.

Buddhist monks, who were expected to transmit their knowledge to the laity through sermons and good works, formed religious communities called viharas. These consisted of cells for the monks and sermon-halls (chaityas) in which to address the laity. Other related buildings used for meditation and prayer included stupas, Bo-tree shrines, image houses, and chapter houses. Buildings in which to receive the offerings of pilgrims and to hold the annual ceremonies and processions also found a place in each vihara. Cells for the monks were placed at a lower level than the communal buildings in a number of concentric squares. The refectory and the hot water bath were usually in the outer court alongside the main entrance.

Larger monasteries housed a thousand or more monks and had spectacular groups of buildings with colossal stupas, splendid image houses, baths, refectories and chapter houses of several storeys. There were also small groups of monks who lived in leaf huts in the forests as required by the texts, and these forest monasteries had none of the symbolic elements of the larger establishments.

Here the central features were usually a hall for retreat and a meditation walk. A single community building served as the refectory and preaching hall where the monks received offerings of food from the laity and in return provided spiritual guidance. The three scales of Buddhist monastic institution have close European parallels: the expansive Benedictine monasteries of mediaeval France were similar to the major Buddhist monasteries of south Asia; the forest monasteries resembled the strict Carthusian establishment; the Cistercian monasteries might be compared to the modest medium-sized viharas which avoided all extremes as suggested in the Manjusri Vastusastra.

Buddhist shrines differed from those of the Hindus and Jains in two principal respects: they were designed for congregational as well as devotional use by the monks (see above) and in their design decorative